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A PROGRESSIVE GEOGRAPHY

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A PROGRESSIVE GEOGRAPHY

BY

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BRITISH EMPIRE," ETC.

BOOK I

THE HOME REGION AND
THE HOMELAND

REVISED EDITION



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PREFACE

This series is not an experiment, but rather the outcome of many experiments to find a course of geographical teaching suited to the needs of the majority of the pupils of a secondary school of modern type ; that is those who enter the school at the age of eleven and stay for five years, during which time they devote two or three lesson periods a week to geography.

The course has two objects, the former being regarded as the more important :

(1) to arouse an active and intelligent interest in the world, its peoples and their problems ;

(2) to give a sufficient knowledge of the technique of the subject to enable pupils to pass the General School Examination at the end of the course and to carry their studies of formal geography to a higher stage if they so desire.

Book I covers the first year's course and deals with the *school locality* and the *British Isles*, the author believing that without a clear understanding of the principles of geography as shown by first-hand examples the study of distant lands is bound to be of little permanent value.

Book II commences the continental studies with *Africa*, this being chosen on account of :

- (1) the relative simplicity of its physical structure ;
- (2) the symmetry of its climate and vegetation belts ;
- (3) the close relationships it exhibits between geographical environment and human activities ;
- (4) its striking contrasts with the homeland ;
- (5) The large British interests in Africa, affording examples of the various activities of white men in the lands of other peoples.

Australia follows naturally, affording many comparisons with Southern Africa, but introducing a new "colour problem," while *New Zealand* makes a very interesting and relatively simple geographical study suitable for the early part of the course.

Book III deals with *America*, affording examples for wider study of physical and climatic factors, and of human societies varying from the most simple to the most complex.

Book IV deals with *Eurasia*, where physical and political geography are more complicated than in any other of the continents.

Book V is a revision course of *World Geography* in which the earlier studies are co-ordinated and more detailed treatment is given to those parts of the work which have been dealt with in a rather more elementary manner in the earlier years.

The treatment is progressive, becoming more detailed and bringing in more difficult ideas as the pupils advance in age. In the earlier stages more attention is given to means of livelihood and industrial processes so that such expressions as "farmers," "nomads," "coal mining," "textile industries" may be something more than words when used in later stages of the work. So also such ideas as contour lines and actual temperatures which can be studied first-hand are introduced early, leaving more generalized ideas such as isotherms and formal "natural regions" till the pupils are better able to grasp their meaning.

In those Schools where only four years are devoted to the School Certificate Examination *Books II* and *III* might be replaced by *Book IIa—Britain Overseas*.

Those who are able to devote more than the usual but rather inadequate two lesson periods a week to geographical studies will find ample scope for further work in the questions and exercises attached to each chapter. This feature will also make the series well adapted to the needs of those working on individual lines.

Access to a good atlas and to pictorial illustrations of various kinds is assumed.

C. B. T.

In revising the present edition, bringing the series up to date, I am pleased to acknowledge the valuable help of my former colleague, Mr. S. Burton, B.A.

1935.

C. B. T.

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THE HOME REGION AND THE HOMELAND

CHAPTER I

WHAT GEOGRAPHY IS

The word geography really means earth-writing or description of the earth; but any study of the earth's surface, the forces that mould it, and the things and people that live upon it may be regarded as a branch of geography. In these books we shall study many parts of our own country and of the rest of the world, endeavouring to find out what each of them looks like, what its people are like and how they get a living. We shall see that although people in different parts of the world differ greatly from each other, this is largely on account of the differences in the regions where they live, all trying to make the best of the conditions in which they find themselves.

The South Wales miner, the Suffolk farmer, the Lancashire cotton spinner, the Highland shepherd, the London clerk, lead very different lives; but all are doing useful and necessary work best suited to the parts of the country in which they live. So also are the naked black men who tap the rubber trees in the jungles of Central Africa, the Red Indian trappers in the forests of Canada, the brown and yellow workers on the tea plantations of India and China.

By our studies of these and many more, and also of the ways by land and sea and air which keep all these peoples in touch with each other, we shall gain an idea

of the world in which we live as a place only needing for its full and happy development the careful thought, hard work and peaceful co-operation of its peoples.

LOCAL GEOGRAPHY AND MAPS

The best way to study geography is, of course, to travel with our eyes really open to see the districts and countries we pass through and to observe what the inhabitants are like and what they are doing. But limits of time, means and physical strength make it necessary for most of us to rely on the accounts of other travellers for much of our geography.

We can, however, all study the district that lies around our home, and other districts to which we may go for holidays ; and our studies of these will help us to understand better the accounts of those regions which we may never see.

There are two ways of recording the results of our geographical observations :

(1) By writing, (2) by maps or diagrams ; and where possible the latter is often the better way, for it generally occupies less space and can be more easily referred to and understood by other people.

Maps are of many kinds, as may be seen by looking at any good school atlas. There are *physical maps* which show land and water, hills and valleys, lakes and rivers. *Climatic maps* show which parts of a region are hot or cold, wet or dry. *Population maps* show in which parts of a region many people and in which few people live. *Vegetation maps* show the parts of a country covered with forests or grass-lands and where certain crops are grown. *Geological maps* show the nature of the rocks and soils, e.g. where we may find granite or chalk or sandstone or coal or clay. *Political maps* show how the land has been divided up among different races or sections of people for purposes of government.

The making of a good map is a long and difficult piece

of work for skilled surveyors ; but the making of simple sketch maps which may be quite useful and interesting is by no means difficult. Try to draw for yourself a sketch plan or map of the school buildings and playground or sports field, and also a map showing the route from school to the station or your home.

We will now see how a set of maps can be made for your own district with the help of the Ordnance Survey Maps. You may not have time to construct them all in class, but the collection of the necessary material and construction of the maps will make a very interesting hobby for spare time.

CHAPTER II

ORDNANCE SURVEY MAPS

These are the most useful in connection with a study of local geography. As their name implies, they have been surveyed and drawn by soldiers for military purposes if necessary ; but they are very useful indeed to ordinary peaceful people.

THE SIX-INCH ORDNANCE MAP

Obtain the sheet of the Six-inch Ordnance Map on which your school is marked and study it as suggested in the following exercises.

Position and Direction.—(1) Note the position of your school on the map.

(2) Find any road which runs approximately north and south, i.e. parallel to the sides of the map.

(3) Find any street or road running east and west, i.e. parallel to the top and bottom of the map.

(4) Find any place or object marked on the map which is due north of the school, then one due south, and so

on. Test the position of the point which is shown to the south by noticing whether the sun is in that direction from your school at noon (or at 1 p.m. when "Summer Time" is in force).

(5) Trace out from the map any common walk you take. Write down in order the names of the roads you traverse and the direction in which you are going in each case.

(6) Notice how the following are shown on the map—fields, railways (single and double track), woods, rivers, streams, bridges over and under railways, embankments, cuttings, footpaths, railway signals, sign posts, pillar boxes, etc.

Scale.—(1) Find the scale of the map. How many inches represent 1 mile? Note that this fact gives its distinguishing name to this type of map.

(2) Find places which are approximately 1 mile, half a mile, quarter of a mile from the school.

(3) How far is it from school to the nearest railway station, the post office, a church, the river, etc.?

(4) Write instructions for a stranger to find his way from school to some other place shown on the map, noting carefully directions and distances. Construct a sketch map from your instructions and compare with map.

(5) Compare any sketch map of a walk you have made with the actual directions and distances shown on the map.

(6) Find the area of any field shown on the map.

(7) What area does the whole map represent?

Height.—Notice at various points on the map a small arrow with the capital letters B.M. and some figures close to it. If you were to go to the actual place whose position is shown by the arrow you would notice carved on a convenient wall or post near by a broad arrow thus ∇ . This is called a Bench Mark and indicates a place at which the surveyors set up their levelling instruments in order to find the height of that place with

reference to other points in the neighbourhood, and finally to calculate its height in feet above mean sea level. This latter height is recorded by the figures shown on the map. Find the nearest bench mark to your school and note its height. Is the land on which the school is built higher or lower than this point?

Sometimes the height of a point on the road is shown on the map without bench marks. Look over your map and find the highest point marked in either way. How much higher is it than your school playground? Can a good view of the surrounding country be obtained from that point?

Construct as follows a diagram to show the rise and fall of the land in a walk of 1 mile from the school. Draw a horizontal line 6 inches long and let one end represent the position of the school. Set up a perpendicular line to represent the height of the position above sea level on a scale of 1 inch to 100 feet. Now mark along the horizontal line the distance of the first point from the school whose height is shown on the map. Construct a perpendicular line to represent its height and repeat this for all the points marked. Connect the tops of the perpendiculars by a curved line showing how the land rises and falls (*see* Fig. 1). Compare the horizontal and vertical scales. How many feet are represented by 1 inch in each case? Write down how many times the vertical scale is exaggerated as compared with the horizontal.

Contour Lines.—Notice on the map lines consisting of alternate dots and dashes thus ·—·—·—· and numbered 100, 200, 300, etc. These are contour lines and are drawn by the surveyors from a consideration of the definite heights shown by the bench marks, etc.; and also by the appearance of the land as seen during the survey. Each contour line goes through points shown on the map which are the same height above sea level, lines usually being drawn for each 100 feet difference in height. Sometimes the interval between the contour

lines is only 50 feet, while in mountainous districts the interval may be 250 feet.

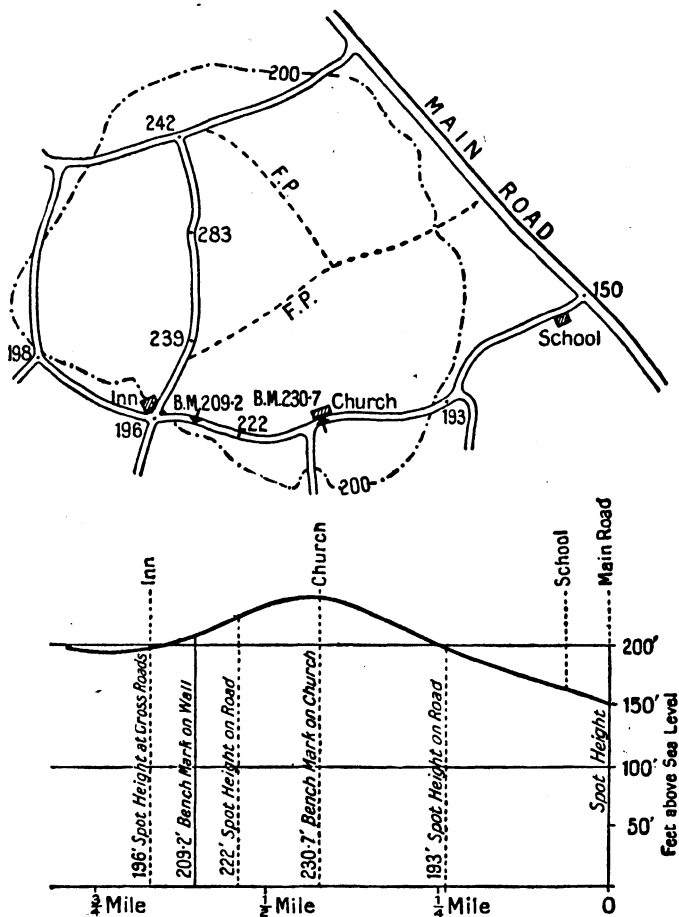


FIG. 1.—Map and Profile of part of a Road.

Notice that on one side of any contour line all points are higher than the height shown by the contour, and

on the other side of the line all points are lower. Fig. 1 shows a contour line of 200 feet and the position of several points above and several below that level.

QUESTIONS AND EXERCISES

1. Make a list of objects (churches, stations, etc.) shown in the 6-inch map which are within a mile of the school. State the direction and distance of each from the school. From your table make a new map with the school as centre and show the positions of the other places on a scale of 2 inches to 1 mile. Compare your map with the ordnance map.
2. Make a list of the abbreviations to be found on the 6-inch map (M.P., B.M., etc.). State what each represents.
3. Why cannot two contour lines cross each other?

CHAPTER III

LOCAL MAPS MADE WITH THE HELP OF THE SIX-INCH ORDNANCE MAP

I. Physical.—Make a tracing of any convenient contour line shown on your ordnance map and transfer it to your drawing paper. Shade or colour all parts of the tracing where the land is above that height. Again place the tracing on the map and mark in a higher contour. Shade or colour more darkly the land above this level. Repeat if possible with other contours, and notice how your map now marks out the hilly parts of your district. Now trace in any rivers or streams shown on the map and notice how they run from the darker to the lighter portions of the map. Now print neatly the names of any well-known hills, streams, lakes, rivers and parts of the sea, and you have a simple physical map of the district shown on the map. Notice how it agrees with your own knowledge of the district.

II. Communications.—Make a new tracing from the Ordnance Map showing main roads, railways, canals, etc. Place this tracing over the physical map made before

and see how the various means of communication have had their direction influenced by the physical features. Use distinct colours for different means of communication—bus routes, electric railways, tramways, canals, etc.

III. Vegetation.—Notice that the 6-inch map shows every field and also woods and marshes in your district. Go out with the map or a tracing of it and note down how each field is used, whether for pasture, or growing crops, or allotments, or parks or playing fields, etc. Choose a distinctive colour for each type, and where crops are grown write the name of the crop across the field. In the case of woods note the commonest trees. This map should be dated and compared with similar maps made in different seasons and different years. Shade in the areas that are built upon.

IV. Public Services.—On another tracing mark in a special way all public buildings, e.g. churches, schools, libraries, post offices, railway stations, hospitals, fire stations, council offices, gas works, power stations, water works, etc. Show also market-places, docks, public parks, refuse dumps, etc. All these places are serving some useful purpose in the life of the community of which you are a member. Find out what you can about any of them.

Other maps could be planned out in a similar way if the necessary facts can be obtained, e.g. a geological map showing the different kinds of rocks and soil to be found in the district, a population map showing the density of population (number of people per acre) in each parish or electoral district, a map showing the position of mines, works and factories with a statement of what is produced at each, a historical map showing the size of your village or town at different dates and the position of any ruins, buildings, roads, or objects of historical interest.

Each map made by you or your classmates should be carefully described in your note-book, all its important

and interesting features being noted in your descriptions. In this way you will have compiled a geography of your own district and will be able to understand better the geography of other regions to which you may go and about which you will read.

For example, with reference to your physical map you will state where the high land lies, how high it is and of what rock it is composed. Then name the local river, stating whether it is fresh or salt water, whether tidal or not, where it rises and where it joins another river or enters the sea, whether there is much or little traffic upon it and of what kinds, whether it serves any other useful purposes, e.g. for drainage or irrigation, fishing, driving water mills, use in factories, supplying a canal, etc., whether it flows slowly or swiftly, whether it winds very much, whether its banks are high or low and of what they seem to be made. If you live near the coast note its nature, whether high or low and of what rocks it is composed. Note the nature of the beach and see whether it is composed of boulders or pebbles from local or distant rocks. Is the coast building up or wearing away, and are any steps being taken to prevent these movements? How often is it high tide and to what height does the tide rise and fall? When are tides highest?

With reference to your map showing means of communication note where the routes lead in each direction and the nature of the principal traffic that passes along roads, railways and canals. Point out how the physical features of your district or any other facts have affected the routes, and the traffic.

In connection with your vegetation map note the relative area of wood-land, grass-land, and cultivated land, and describe how each is being used. Notice whether the same sort of crop is grown on a field each year or, if not, whether any particular crops are grown in succeeding years. If most of the land is used for

pasture state which kinds of animals are most numerous. Notice if you can whether the soil varies with different fields and whether that seems to have any effect on the use to which they are put. Find out whether the climate of your area has anything to do with the vegetation.

Try to account for the various industries carried on in the neighbourhood, showing what natural causes have encouraged each. Find out the different materials used and produced, the number of people employed and the various processes carried on, whether water power, steam or electricity is used, and the markets for the finished products. In the case of docks find out the nature of cargoes loaded and unloaded, where they are produced and where they are going, the size of the ships and means of unloading them, whether ships can enter and leave at all hours or not, whether dredging is necessary and if so, why.

Using your historical map try to form a picture of what your district was like in ancient and mediæval times: if it has grown more or less important in any way try to account for the facts. Are there any signs that your district is growing or diminishing in importance or changing in any way at the present time? What differences might you expect to find in it in a hundred years' time?

CHAPTER IV

THE ONE-INCH ORDNANCE MAP

Maps on the scale of 1 inch to the mile can be obtained for all parts of the country. Unlike the 6-inch maps, which are only in black and white, the 1-inch map may be obtained coloured in various ways to show different features. For example, the Popular Edition of the 1-inch

map shows water in blue, woods in green, contour lines brown, first-class roads red, medium roads brown.

Try to obtain the sheet of this map which shows the position of your school and note the following differences from the 6-inch map :

No bench marks are shown although the exact height in feet of certain points above sea level is marked on the map as well as the contour lines for each 50 feet.

Separate small fields are not indicated.

The shapes of various buildings, such as schools and churches are not shown, but in connection with each church there is an indication as to whether it has a spire or a tower or neither.

Names of roads and streets in a town are not marked, and small streets are not shown at all.

Work the following exercises in connection with the map :

(1) Draw in pencil on the map a rectangle showing how much of the area was covered by your 6-inch map. What fraction is this rectangle of the area of the 6-inch map? How much land does it represent?

(2) Find places which are approximately 2 miles, 5 miles, 10 miles from your school and state in which direction each lies. Find the distance and direction of any well-known places.

(3) What are the highest and lowest contour lines marked on the map? Are there any points higher and lower than these respectively? Try to go to a high point shown on the map. Take the map and see what places and features marked upon it you can see from that point.

(4) Using the contour lines and spot heights shown on the map construct (as in Fig. 1, p. 14) a diagram showing the ups and downs of a walk or cycle ride of 6 miles from your school.

(5) Plan out from the map an interesting half-day or whole-day ramble, and write a description of the route,

mentioning points of interest you might expect to notice by the way.

(6) Choose convenient contour lines and make a tracing of them on a sheet of paper. Shade or colour the map to indicate the relatively high, medium and low parts of the area. Mark on the map the larger rivers, streams, lakes and canals, also the sea if any is shown on the map. Describe what the map shows.

(7) Make a tracing of the main roads and railways shown on the map, indicating each by different colours. Show on this map each market town with a red dot and each village with a black one. Compare this with the physical map and see whether the physical features appear to have had any effect in locating routes and towns. What is the greatest distance of any village on your map (a) from a market town, (b) from a main road, (c) from a railway?

MODEL MAKING AND SECTION DRAWING

Take a sheet of cardboard and cut it to the size of your 1-inch Ordnance Map or any selected area of it. Then trace out on a piece of paper the lowest contour line shown. Paste this on a piece of cardboard and cut round the line with knife or scissors. This piece can now represent all the land on the map above the height of the selected contour line, and should be placed correctly in position on the base board. Now trace out the next contour and proceed in a similar way, placing each piece of cardboard when cut out in its correct position. In this way you will notice that you are gradually building up a model showing quite clearly the higher and lower portions of the country. You might then work upon the model the position of rivers and streams, railways, villages, etc. Of course in reality the land does not usually rise in steps as your model would seem to indicate. You can smooth out the steps and give a more real appearance by the use of plasticine so as to

make a more gradual descent from the level of one contour to the next.

Notice that where two or more contours are very close together on a map a steep slope of the land is indicated, while where the land falls gradually the contours are much wider apart.

The general rise and fall of the land shown on a map may sometimes be very clearly shown by constructing a

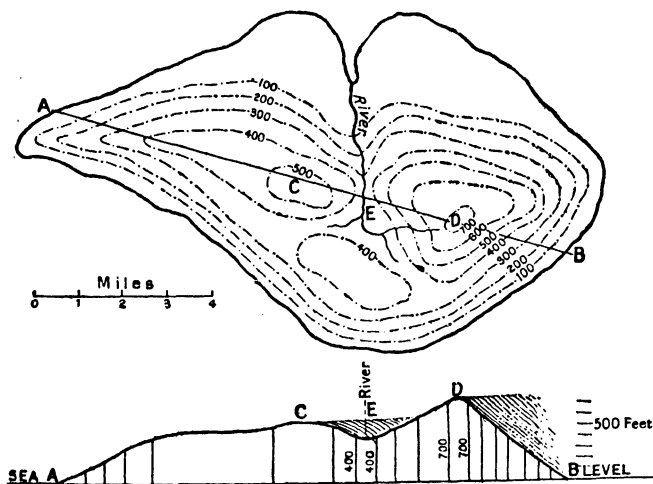


FIG. 2.—Contoured Map of an Island and Section across it from A to B looking N.E.

section in the manner shown in Fig. 2. Suppose we wish to draw a section of the land along the line AB. Draw a line equal in length to AB and mark upon it each point at which AB cuts a contour line. At each point erect a perpendicular proportional in length to the height shown by the contour in each case. Connect the ends of these perpendiculars as shown. The section shows that crossing the island from A towards B there is first a gentle rise from the coast to the point C; the land then falls

to the valley E and once more rises steeply to D, from which there is a very sharp fall to the coast at B.

It should be noticed that in the case shown the distance from A to B is about 12 miles, while D, the highest point, is just over 700 feet above sea level. Calculate how much 1 inch represents horizontally and vertically respectively and then find how much the vertical heights are exaggerated. Reconstruct the section with less exaggeration, and then again, if possible, with the same scale for both horizontal and vertical distances and compare the three drawings.

Such a drawing is called a section, which means a cutting, because it shows what the appearance of the land would be if it could be cut along the line of section and all the land on one side of the cut removed.

Try to make a plasticine model of the island shown in Fig. 2. Then cut it along the line AB with a knife and remove the part of the model to the south of the line. Compare the north face of the cut with your section drawing.

Draw a section of the country in your own district between any two points about 6 miles apart, using the 1-inch Ordnance Map and taking a vertical scale of 1 inch = 1,000 feet.

CHAPTER V

CLIMATE

The meaning of climate will perhaps be best understood by a few examples. If you were to ask anyone who had been up the Amazon River in South America or on the Gold Coast in West Africa what the climate was like there he would say that it is always hot every month in the year, and night as well as day, and that few days pass without some rain, while heavy thunder-

storms are frequent. The reply to a similar question put to a friend home from Central Canada would probably be that there the winters are intensely cold but quite bright and with not much snow, while the summers are much hotter than in England, and that there is less rain than in any part of the Mother Country. One who had lived in Bombay would speak of the heat and tremendous rainfall of the summer months and the pleasant, warm, dry winters ; while a soldier home from Gibraltar would tell of the intense heat and drought of the summer and the pleasant mild winter months when the rain comes and freshens up the parched gardens, filling them with flowers.

So you will see that when we speak of climate we are considering mainly two things—the *temperature*, or degree of warmth of the air, and the *rainfall* at different parts of the year. A moment's consideration will show how important these are. Upon temperature and rainfall, more even than upon the soil, depend what plants will grow, and man and his animals are both dependent upon plants for food. Also, where the winters are too cold, rivers and lakes and, in places, even the sea will freeze and great care will have to be taken by the people to avoid perishing from cold and hunger. Drought also will lead to famine, while too great heat and rainfall tend to make places unhealthy.

In Britain we are fortunate in having a climate where extremes of summer heat and winter cold are very rare and where severe drought and excessive rainfall are almost unknown. But even within our own land there are distinct differences of climate between one district and another, as we shall learn in later chapters.

In order that you may understand fully the climate of other districts and other lands you should learn carefully the facts concerning the climate of your own district. To do this, work as many of the following exercises as possible.

TEMPERATURE

(1) Take the reading of a thermometer in your room or outside the window at the same time each day and

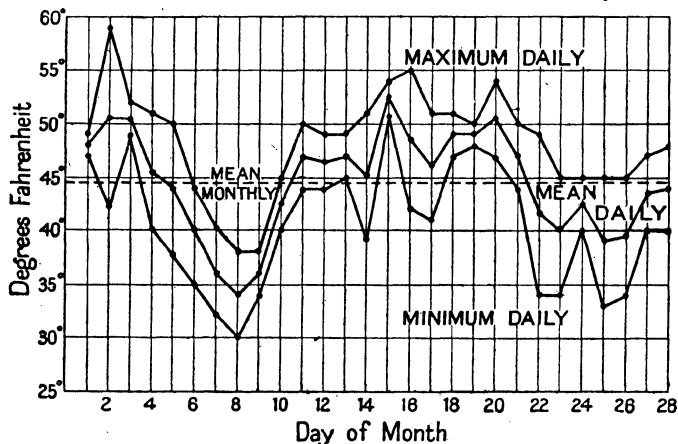


FIG. 3.—Maximum, Minimum and Mean Daily Temperatures for February, 1935; also Mean Monthly Temperature for February, 1935—at Kilburn.

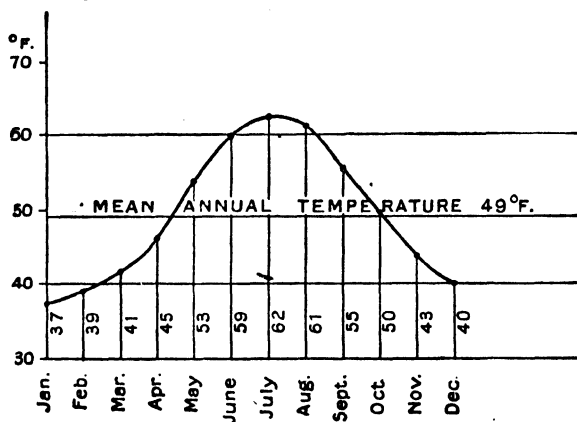


FIG. 4.—Average Mean Monthly Temperatures and Mean Annual Temperature for London for 30 years.

plot the readings on squared paper. Join the points marked to show the rise and fall from day to day.

(2). Get a Maximum and Minimum Thermometer—that is one which records by itself the highest and lowest readings since it was last set. Place this out of doors in a shady place. Take the readings of maximum and minimum temperature at the same time each day and re-set the indexes. Plot the readings on squared paper. Take the average of the two to find the *mean daily temperature*. Add up these means for a whole month and take their average giving the *mean monthly temperature* (see Fig. 3). Suppose this was done every January for a number of years and the average of all these results was then taken we should have the average mean monthly temperature for January. If this were done similarly for every month and then the average of all the months were taken we should have what is called the *mean annual temperature* for the place (see Fig. 4).

Try to obtain these average values for your own district and remember the figures for the hottest and coldest months. For comparison notice those given in the table below for a number of places in Britain.

Place	Average Mean Temperature.		
	January.	July.	Annual.
Oxford	38° F.	62° F.	50° F.
Falmouth	43	61	52
Scarborough	38	59	48
Fort William	39	57	47
Ben Nevis	24	41	31

It will be noticed that—

(1) In all these places July is warmer than January. This is because the sun is above the horizon for more hours each day in the summer and also because it gets

higher in the sky and therefore shines more directly and intensely at that season.

(2) In all the places except the last the mean annual temperatures are fairly similar; not much above or below 50° F.

(3) At the observatory on Ben Nevis, about 4,400 feet above the town of Fort William which lies at the foot of the mountain, the temperature is always about 16 degrees cooler than in the town. From October to April the mean monthly temperature on Ben Nevis is always below 32° F., which is the temperature at which water freezes, so that for those seven months snow is always to be found on the mountain.

(4) In most places in Britain the mean temperature of the coldest month is above the freezing point. Thus although streams and lakes and rivers may occasionally be frozen over owing to frosty nights, this does not usually last for a long period so as to interfere seriously with outdoor activities and communications. Of course in the higher parts, as is seen in the case of Ben Nevis, temperatures are always lower by about 3° F. for each 1,000 feet of elevation.

(5) Places in the north of Britain have usually a slightly lower temperature than those farther south. This is because the sun does not rise quite so high in the sky on any day at the former places as in the latter and therefore does not shine so intensely.

(6) Places inland have a greater range of temperature between winter and summer than places on or near the coast, e.g. at Oxford the range is 24 degrees ($62-38$), while at Falmouth and Fort William it is only 18 degrees. This is due to the facts that water becomes heated less quickly than land and therefore keeps cooler in summer, while it also loses its heat less quickly and therefore remains warmer than the land in winter.

It is, indeed, because no part of Britain lies very far from the ocean that the whole country has such an

equable climate, i.e. one without great extremes of summer heat and winter cold.

RAINFALL

This is measured by the depth to which rain would cover a level surface if none were allowed to drain away or soak in or evaporate. The rain gauge (Fig. 5) is the instrument by which it is measured. The rain that falls upon the area represented by the top of the funnel F is collected in the bottle B. The water is measured in

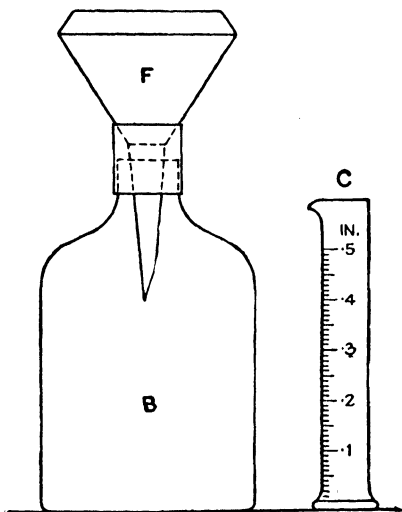


FIG. 5.—Simple Rain Gauge.

the cylinder C, the area of the top of which has a definite known proportion to that of F. For example, if "1 inch" of rain falls on F it might fill C to a depth of 10 inches. C is graduated accordingly and in this way quite small fractions of an inch of rainfall can be measured.

If you have a rain gauge work the following exercises :

- (1) Set the rain gauge in a good open space and safe

from being blown or knocked over : set the part B well in the ground if possible. Each day at the same time measure the quantity of rain that the gauge has collected during the previous twenty-four hours. If the fall has been heavy, be careful to notice how many times you fill the cylinder from the bottle. Enter the readings in a note-book and also plot them on squared paper, making a rectangle to represent the depth measured each day.

(2) Total the readings for a month to get the monthly rainfall. If this is done for the same month in a number of years and the average of the totals is taken this gives the *mean monthly rainfall* for your place.

(3) Total all your readings for a year to get the annual rainfall, and if you have the results for several years find their average to give the *mean annual rainfall* of your district.

RAINFALL MAPS

A rainfall map for a large area is made by writing upon it figures obtained as above for a large number of places, and then connecting by a line all those places which have a certain rainfall during the period concerned. This is done in a similar way to the construction of contour lines (*see* p. 13).

Fig. 6 represents a simple Mean Annual Rainfall map for the British Isles constructed in this way, lines having been drawn through those places which have an average yearly rainfall of 30 inches and 60 inches respectively. The areas enclosed by these lines have been shaded and show at a glance the wettest and the driest parts of the country.

Compare this map with the physical map of the British Isles (Fig. 7) and notice the following facts :

(1) The higher parts are generally wetter than the lower parts. It may be noted, for example, that while Ben Nevis records over 160 inches per annum Fort William has only 75 inches.

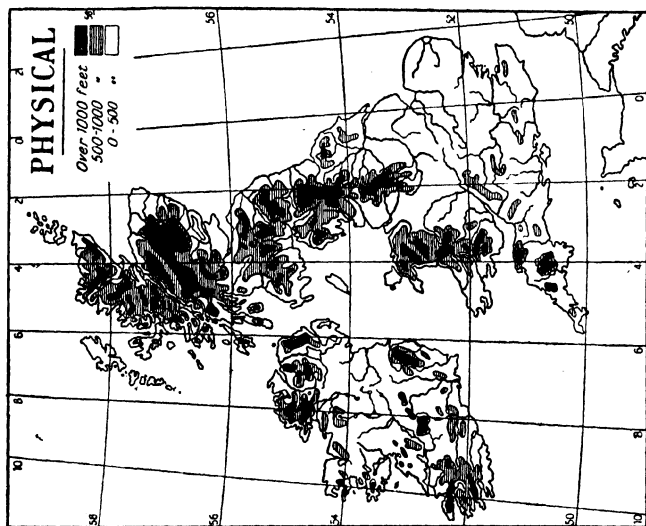


FIG. 7.

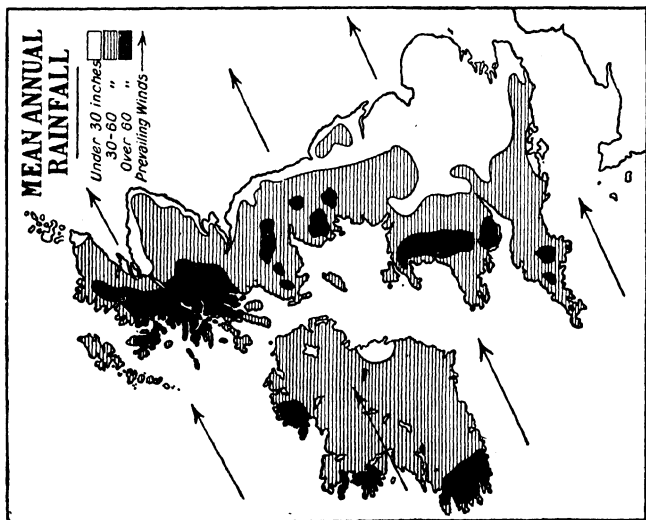


FIG. 6.

(2) The western side of the country, even in the lowlands, is wetter than the eastern, e.g. Aberystwyth on the west coast has about 40 inches per annum, while Lowestoft on the east coast has only 25 inches.

The reasons for these two facts may now be considered. It is common knowledge that rain is caused by the condensing of the water vapour in the clouds, and that this condensation is brought about by cooling. The clouds are brought to Britain by the winds from surrounding seas. If you keep a record of the wind direction each day you will find that on the majority of days throughout the year the wind comes from some westerly direction,

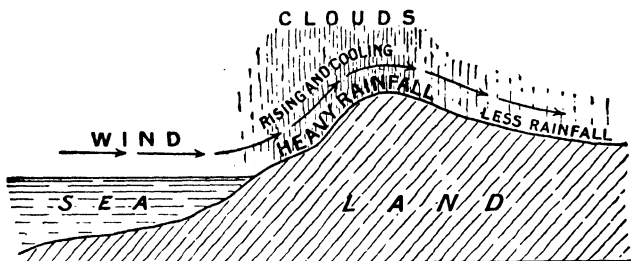


FIG. 8.—Showing that rainfall is heavier : (a) on high land than on low land, (b) on windward than on leeward side of high land.

that is from the broad Atlantic, and is therefore heavily laden with moisture. On reaching Britain the winds from the sea are caused by the land to rise and become cooled, the rising and cooling being greatest of course in the higher districts. Thus most rain falls in these parts, and as the clouds have less moisture to deposit as they pass eastward, while at the same time the land is lower in that direction, the eastern side of the country is drier than the western (Fig. 8).

We shall study further causes of rainfall in later parts of our work, and shall also see its effects upon the scenery and lives of the people in different regions. It may be noted here that in Britain it is only in the regions with

less than 30 inches of rain per annum that much corn can be grown successfully (*see* p. 76), the wetter regions being better suited for the growth of rich pasture and root crops for cattle. Thus Eastern England is the chief corn-land and the plains of Ireland the largest cattle-farming area in the British Isles.

Having learnt something of the way to study the geography of our own district we will now learn a little of other parts of the country and see in what ways they are like and unlike our own home region.

QUESTIONS AND EXERCISES

1. Draw graphs showing the average mean monthly temperatures of the following places. The months are taken in order starting with January and the temperatures are in degrees Fahrenheit.

Ben Nevis . . .	24, 24, 24, 28, 33, 40, 41, 40, 38, 31, 29, 25
Glasgow . . .	39, 39, 41, 45, 50, 56, 58, 57, 54, 47, 43, 40
Aberystwyth . .	41, 42, 43, 48, 53, 58, 60, 61, 57, 52, 46, 42
Leicester . . .	38, 40, 42, 47, 52, 59, 62, 61, 57, 49, 43, 39
Dover.	40, 42, 42, 48, 52, 57, 61, 60, 57, 52, 48, 45

Point out and try to explain any differences you observe.

For how many months of the year is the mean monthly temperature on Ben Nevis below the freezing point?

2. Draw graphs showing the mean monthly rainfall at the following places. The months are taken in order starting with January and the depths are given in inches and tenths.

Ben Nevis :

18.3, 13.7, 15.1, 8.5, 7.7, 7.6, 10.8, 13.5, 15.8, 15.4, 15.3, 19.1

Blackpool :

2.7, 2.2, 2.2, 1.8, 2.2, 2.1, 2.9, 3.8, 3.2, 3.8, 3.6, 3.1

Seathwaite :

13.2, 11.2, 10.5, 6.8, 7.4, 6.5, 9.3, 11.7, 12.4, 12.2, 14.1, 15.8

Lowestoft :

1.6, 1.4, 1.4, 1.5, 1.6, 1.8, 2.5, 3.3, 2.2, 3.1, 2.4, 2.0

Falmouth :

4.2, 3.4, 2.7, 2.4, 1.7, 2.0, 2.3, 3.5, 2.7, 4.9, 4.8, 6.6

Point out and try to explain the differences you observe.

Which seasons of the year appear to be wettest and driest respectively?

3. Draw a graph from the following figures showing the number of hours of daylight on the first day of each month at London, starting with January.

7.9, 9.1, 11.0, 13.0, 14.7, 16.2, 16.4, 15.3, 13.4, 11.6, 9.7, 8.1.

Find from the curve the date of the longest and shortest days, and the dates when day and night are equal.

4. Draw a graph from the following figures showing the length of the shadow of a 6-foot pole cast by the sun in London at midday on the first day of each month, starting with January. Lengths are given in feet.

21·9, 15·0, 10·3, 7·5, 4·4, 3·4, 3·25, 4 0, 5 5, 8·4, 13 3, 20 7

What do you learn from the graph? On which dates are the shadows shortest and longest respectively? Compare with your answer to No. 3.

Draw diagrams to scale showing height of pole and length of shadow on longest and shortest days. What angles do the sun's rays make with the ground at midday on these days?

CHAPTER VI

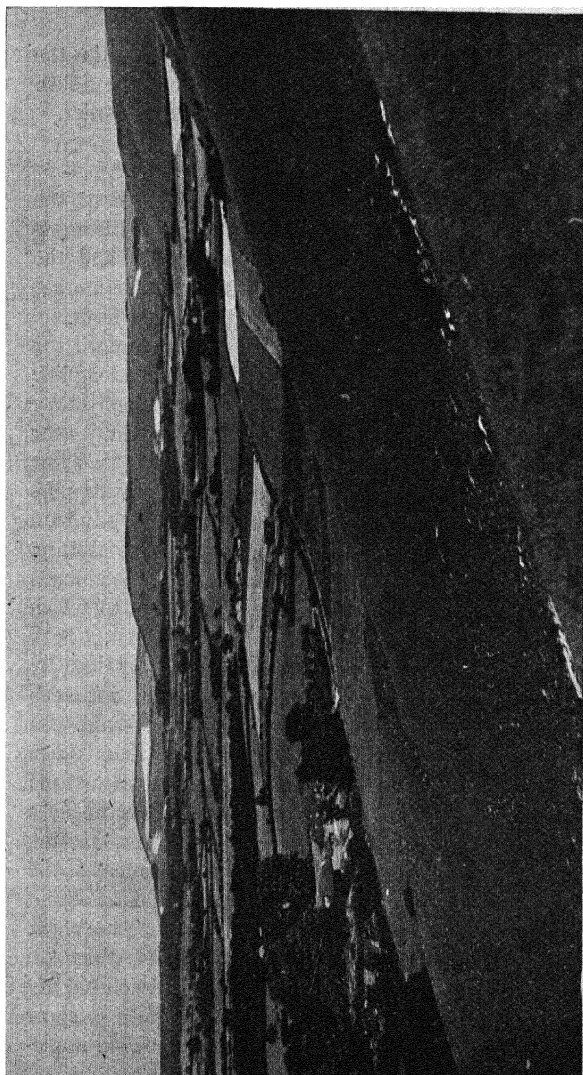
THE SOUTH-EAST OF ENGLAND

This is one of the most interesting regions in the country and shows well how geographical features have influenced the ancient and modern life of the people. Owing to its nearness to Europe it was to South-eastern England that the foreign peoples who have helped Britain to develop first came.

Fifty-five years before Christ the Romans landed near Dover. After they had ruled the country for about five hundred years and left it to defend their home lands, the Jutes, who were the forerunners of the Angles, Saxons and Danes, came across the North Sea and landed in the Isle of Thanet, which at that time (A.D. 449) was really an island. They formed the kingdom of Kent, whose name is still older, being derived from the Cantii, the native tribe whom the Romans found in possession of these parts when they arrived.

The Jutish capital was Canterbury, which means "the town of the men of Kent," and it was to this city that St. Augustine came in A.D. 597 and began the conversion of Britain to Christianity. That is why the Primate of the English Church is still called Archbishop of Canterbury.

In A.D. 1066 came the last real invasion of Britain, and



[Photo : Herbert Felton.]

THE SOUTH DOWNS TO THE NORTH OF BRIGHTON, LOOKING EASTWARD.

Note (1) the short grass with chalk peeping through in places, (2) the few trees on the Downs, (3) the cultivated and well-timbered clay lands of the Vale of Sussex at the foot of the Downs escarpment, (4) the road connecting farms and villages.

the conquering Normans landed near Hastings in the county of Sussex, which got its name from the South Saxons who had colonized it several centuries earlier.

THE DOWNS AND THE WEALD

From the Thames and the north coast of Kent the land rises gently southward and is mostly rich farming land with orchards of apples, cherries, plums and the earlier small soft fruits. There are also extensive market gardens supplying London with vegetables and flowers.

As the land rises higher the soil gets poorer until the top of the North Downs is reached. These are a long line of chalk hills running from Hampshire eastward until they reach the sea in the "white cliffs of old England" near Dover. The porous chalk rapidly soaks up rain that falls upon it and the very thin layer of soil will only support the short grass which covers the Downs as a beautiful carpet of soft green turf. This makes ideal sheep pasture, as the ground is never damp enough to cause the animals to suffer from foot-rot, a very serious disease to which sheep kept in damp places are liable.

The open breezy Downs are also ideal for healthy holiday exercise, and as their southern slopes are steep they command beautiful views across the Weald. In many places, too, on the Downs are to be found huge stone pillars and burial mounds erected by prehistoric man who made his dwellings on these treeless hillsides where he could observe the approach of enemies. In the daytime he would descend to the woods at the foot of the slope to gather fuel, to hunt the animals and to obtain drinking water which oozes out in springs where the chalk joins the underlying clay. The layers of flints, which are also found in chalk, and which can be made to chip fairly easily leaving hard sharp edges, provided the axe, spear and arrow heads and other primitive weapons and implements of our ancestors of the Stone Age.

The map shows that the North Downs, although fairly

continuous, are broken through by several river valleys, and we shall see the importance of these river "gaps."

At the foot of the steep slope or escarpment of the Downs lie the fertile vales of Kent and Surrey, where mixed sand and clay soil and a moderate rainfall favour the growth of corn and fruit and hops, entitling this region to its name of the Garden of England.

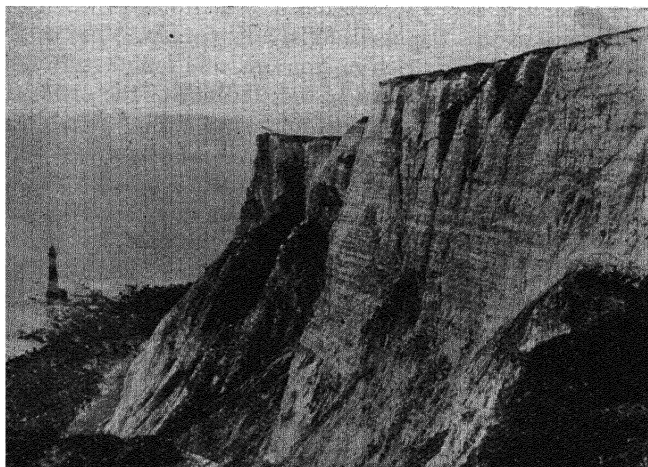
Further south rise the sandstone hills of the Weald, whose name is a Saxon word meaning a forest; but only very small portions of the forest which once covered all this area, except the chalk hills, now remain. The sandstone of the hills is rich in iron ore, and long ago it was found that the iron could be smelted out of the ore with the help of charcoal, which is made by burning wood in a pile covered with turf. So the bulk of the trees were cut down to make charcoal for iron smelting, and before the use of coal for this purpose was discovered the Wealden iron industry was famous. The railings of St. Paul's Cathedral in London are made of old Wealden iron.

Very deep borings have recently shown that there is coal under south-east Kent, and as the Wealden sandstone is still rich in iron, this may lead to a revival of the old industry. But at present the Weald, except in its highest parts, which are tree-covered, is just a rich agricultural area.

South of the Weald lies the fertile Vale of Sussex, very similar to those of Kent and Surrey, and extending to the foot of the South Downs, which rise steep and green and rounded from the well cultivated lowlands, the white chalk peeping out here and there from a quarry in the hillside. Like the North Downs the South Downs are famous sheep walks, and as their crest lies nearer to the open sea they are more famous as holiday haunts. They reach the sea in the magnificent white cliffs of Beachy Head, but west of Brighton the chalk dips more gently beneath the sands and clay of a very fertile coastal plain. Several rivers break through them on their journeys from the Weald to the English Channel.

VILLAGES AND MARKET TOWNS

In a farming country such as this most of the people live in villages, each consisting of a few houses clustered around the parish church or straggling for half a mile or so along the main road. Most of the men and, at certain seasons such as fruit gathering and hop-picking, a good many of the women work on the farms. There are also



[Photo: E.N.A.]

BEACHY HEAD.

Note the layers of flints in the chalk. Why has the lighthouse a black band? Why is it not on top of the cliff?

a few craftsmen, such as the blacksmith, wheelwright and carpenter, the keepers of small general shops and an inn, and a few professional people such as the doctor, clergyman and teachers.

The origin of these villages is often unknown, but sometimes it can be traced to some local hill or bend in a river or stream which could be turned to defensive account in ancient times. The existence of a supply of

drinking water has usually been an important consideration. This can be seen very clearly in the case of the villages in this region. On the top of the chalk downs, where water could only be obtained by sinking deep wells, there are no villages—only a few scattered houses of the shepherds depending on rain-water collected from the roofs. But at the foot of the Downs the water that has soaked through the porous chalk comes out as springs, because it cannot sink through the impervious clay that lies under the chalk. Along this line of springs considerable villages are found every two or three miles, and the fertile vales of Kent and Surrey and Sussex are well dotted with villages, as may easily be seen when looking across the Weald from any view-point on the open Downs.

Here and there some favourably situated village has outgrown its neighbours and become a small town, to which the people of the surrounding villages travel once a week on "market day" to sell produce and make purchases of articles which cannot be obtained in the village, such as boots and clothing, pots and pans, toys and medicines, farming implements, seeds and manures. Here, too, the lawyer or the dentist may be consulted in case of need, and a visit to cinema or concert may be made to vary the daily round of village life. The market towns are usually situated where several routes by road or rail or water converge so that people and goods can be easily brought together. They are seldom more than a dozen miles apart, so that in olden times the people from the remoter villages could walk to the nearest market town and back in a day.

The larger market towns of this region have grown up beside the river gaps in the Downs through which roads and railways have been built alongside the rivers enabling the people of the villages on either side of the hills to communicate with each other (*see* Fig. 9). Where the Downs are widest there may be a market town at each end of a gap; for example, *Rochester* and *Maidstone* in

the Medway gap, *Canterbury* and *Ashford* in the Stour gap.

The importance of some of these gap towns in ancient days is shown by the existence of an old castle built to defend the crossing of the ways. It will be noticed that the county towns of Kent, Surrey and Sussex are each centrally situated gap towns—*Maidstone*, *Guildford* and *Lewes* respectively. Each of these is the centre of the government of the county. There the County Council

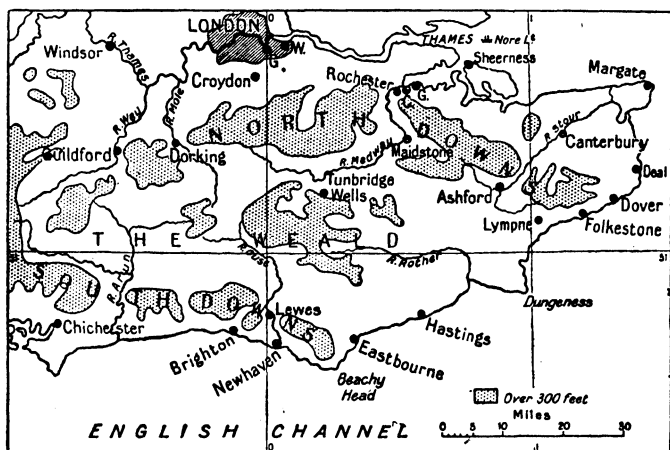


FIG. 9.—South-Eastern England, showing River Gaps, Gap Towns, etc.

meets to discuss and direct matters concerning education, highways, the police, licences, weights and measures, etc.; and there also several times a year comes a Judge to the Assize Court for the trial of important criminal cases occurring within the county.

The development of a town and the changes that have taken place in the life of the people are well illustrated by the case of Rochester at the head of the Medway estuary (Fig. 10). On the open chalk downs a few miles outside the city is a prehistoric monument of four huge

stones similar to those at Stonehenge. But the present city grew from a later settlement, where a hill beside a bend in the Medway gave opportunities for protection from enemies.

When the Romans entered Britain their first great road into the country from Dover was Watling Street, which

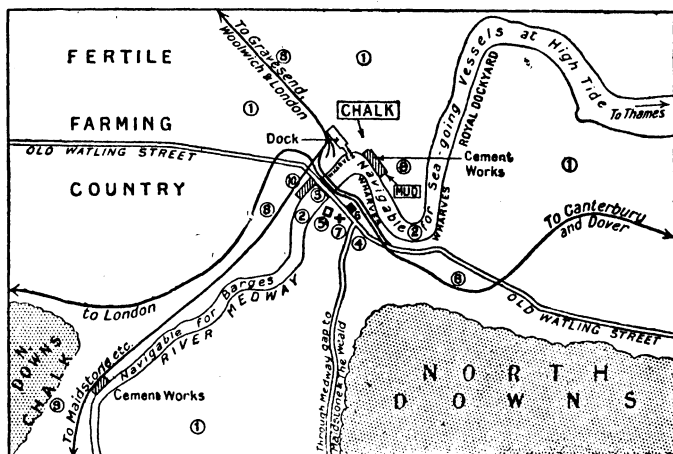


FIG. 10.—Sketch to illustrate the typical factors in the growth of a City (Rochester). See Illustration on p. 41.

1. Fertile Land to produce food. 2. Navigable River. 3. Lowest Bridge Point on 2. 4. Road at foot of hills meeting road through river gap in hills. 5. Castle to guard roads. 6. Establishment of Market under protection of Castle. 7. Establishment of Church or Cathedral. 8. Construction of Railways following line of roads, and Docks for larger shipping. 9. Raw material for manufacturing industries (e.g. chalk and river mud for cement). 10. Manufacturing industry for local needs (agricultural implements and machinery).

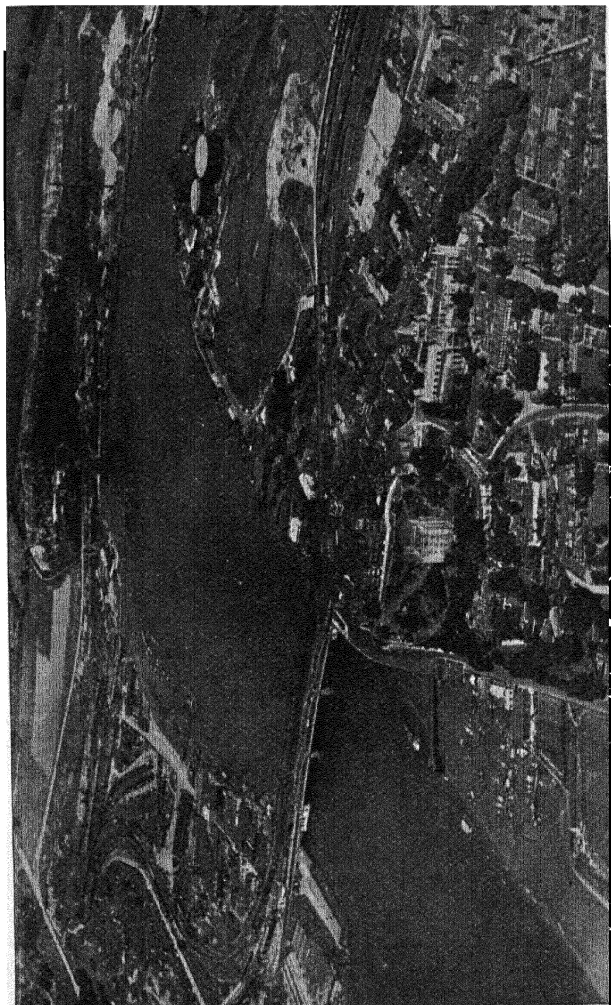
ran along the hillside above the marshes of the lower Medway. A small bridge carried it over the Stour near where Canterbury now stands, but a much larger bridge had to be built across the Medway. To guard the bridge they established a "chester" or armed camp at the old settlement. Under this protection the little settlement grew. The Roman ships and later the vessels of Saxons

and Danes could sail up the Medway till they reached the obstacle of the bridge, and near it therefore the ships would unload, thus beginning the establishment of a port.

After the Romans had withdrawn from the country the protected port and bridge place became an important Saxon stronghold, and when St. Augustine was allowed to build a cathedral and priory there in A.D. 600 its importance was further increased. This was recognized later by the Normans, who in the time of the Conqueror built a huge castle on the site of the old Roman camp; the Keep of Rochester Castle, which has withstood many sieges, is one of the finest Norman relics in Britain. The Normans also rebuilt the cathedral, the nave and west front of which, with their semi-circular arches, are good examples of Norman architecture.

Under the protection of King and Church Rochester became an important market town for the country round and the villages which lay along Watling Street and the road through the Medway gap. This position it still holds, but modern manufacturing industries have been added. Two railway bridges cross the Medway parallel with the large modern bridge for road traffic, which now occupies the site of the old Roman bridge, and these added to the river highway make it possible to assemble raw materials for various industries.

The making of agricultural implements and machinery for the surrounding district has been developed so that now the traction engines and steam rollers made at Rochester, and bearing the Kentish White Horse as a trade mark, may be seen not only all over Britain but in most foreign countries as well. The chalk quarried from the Downs, and the river mud obtained from the Medway estuary are burned together to make cement in the factories that line the river near Rochester, but the largest cement works are now situated on the right bank of the Thames west of Gravesend, where shipment of the finished product is easier than in the Medway. Water of good



Kerosfilms Limited phot.

ROCHESTER.
(See Fig. 10, and Question 7, p. 45.)

quality, obtained from deep wells in the chalk, with locally grown barley, from which malt is made, have given rise to breweries, where the hops, for which Kent is famous, are used for flavouring the beer. All these industries and several others give employment to large numbers of workmen, so that the peaceful city and market town of half a century ago has become a busy industrial centre. Adjoining Rochester are the still larger towns of Chatham and Gillingham, with military barracks and naval dockyard which may be regarded as part of the defences of London.

PACKET STATIONS AND HOLIDAY RESORTS

As south-east England is the nearest part of Britain to the Continent of Europe, with which the British people have much intercourse for both business and pleasure, there are on the coast a number of ports from which boats set out regularly with mails and passengers and goods for the continent. These ports are known as packet stations, and express trains run daily between them and London. The largest and most important is *Dover*, because from it the sea voyage is shortest, the journey of 22 miles between it and Calais taking only about an hour. The tiny natural harbour under the chalk cliffs has had to be enlarged by the building of huge stone breakwaters in order to deal with increasing traffic, and there is also a naval harbour for smaller types of war vessels. Besides the Calais route from Dover mail boats also run daily to Ostend in Belgium, a journey of about 70 miles. *Folkestone* on the Kent coast has regular services to Boulogne, and *Newhaven* at the mouth of the Sussex Ouse is the packet station for Dieppe. In both these cases also the natural harbours which gave rise to the towns have been artificially enlarged and improved (*see Fig. 11*).

All round the coast are a number of small fishing ports, and with the increase of the population of London and of facilities for travel by road and rail many of them

have developed as holiday resorts and even as permanent residences for workers in the great city. *Brighton, Hastings and Eastbourne* in Sussex, and *Margate, Deal and Folkestone* on the Kent coast are among the best known of these. In all these places many people derive a living from the tourist industry.

Tunbridge Wells, with the fine, hilly and wooded scenery of the Weald and its wells of water containing

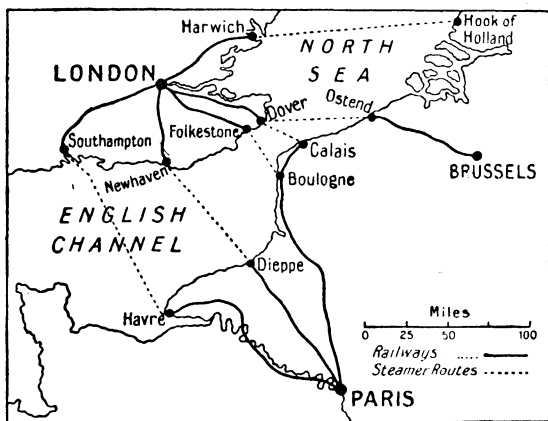


FIG. 11.—Packet Stations and Routes from London to the Continent.

iron dissolved from the Wealden sandstone, has become a famous spa or inland health resort.

ROADS, RAILWAYS AND AIR ROUTES

A map showing the roads and railways in this region indicates how the physical features have determined the chief routes. Both the main roads and railways run either parallel with the Downs through the fertile country on either side, or across the Downs chiefly through the river gaps to connect up the east and west routes and to provide short routes to the coast. The traffic between London and Brighton is so great, however, that it has

paid to defy the hills and construct a direct route by tunnelling through the North Downs, the Weald and the South Downs, so that the two places are within an hour's journey of each other by rail.

In a fruit-growing country such as this, good and rapid means of communication are essential, for some fruit, such as strawberries and raspberries, must be placed on the market within a few hours of picking if they are to be saleable. These fruits are usually picked in the afternoon, carefully packed in small baskets and despatched to Covent Garden Market in London by special train or motor lorry for sale in the early hours of next morning, so that they can be in the retail shops in less than a day from the time they are picked.

The express rail services to the packet stations have already been mentioned, and in the summer time especially the traffic on the roads and railways leading from London to the coastal resorts is very heavy indeed.

The busiest aeroplane service for mails and passengers—that between London and Paris—crosses this area between the aerodromes of *Croydon*, a large residential suburb in Surrey, and *Lympne*, which was an old Roman port of entry into Britain.

QUESTIONS AND EXERCISES

1. Draw separate sketch maps to show the routes by road, water and railway converging on Canterbury, Ashford, Maidstone, Lewes and Guildford respectively.

2. What are the cliffs made of at Eastbourne, Hastings and Folkestone? Why are there no cliffs at Dungeness? Why are most of the pebbles on Brighton beach made of flint?

3. What places in the area show by their names that they were established at a point where a road crossed a river?

4. What place-names show the Saxon "ham" (meaning a settlement) or "ton" (a stockaded village), Danish "wich" or "wick" (bay or creek), "ey," "ea" (an island), "gate" (road or way)?

5. Draw a sketch map showing the packet stations of S.E. England and their corresponding foreign ports. Measure and inset on the map the distance of each from London and of the sea route, and find out from a time-table the journey times in each case. What English railway serves all these routes?

6. Draw a rough section across the region from London to Brighton showing the North Downs, the Weald, the South Downs and the Vales of Surrey and Sussex.

7. Compare the aeroplane photograph of Rochester on page 41 with Fig. 10. How many of the things noted in the map can you find in the picture?

CHAPTER VII

WESSEX

This is the name sometimes given to the counties of Hampshire, Wiltshire and Dorsetshire, which were the shires or shares of various tribes of the old kingdom of the West Saxons who invaded Britain by way of Southampton Water after the withdrawal of the Romans.

The whole area may be likened to a great basin of chalk filled in with sand and clay. The chalk rim is intact on the north side where the Downs of Dorset and Hampshire and Salisbury Plain give rise to scenery similar to that of the North and South Downs—open grassy slopes which make excellent sheep pastures. The southern rim of the basin has been broken through by the sea on both sides of the Isle of Wight, exposing white chalk cliffs at Swanage, the Needles and the Culver Cliff. On the chalk downs are many wonderful relics of prehistoric man, the best known of which is probably Stonehenge, a monument or temple made of huge stones arranged in the form of two circles in the middle of the bare and open chalk plateau called Salisbury Plain. This great wide-spreading grassland is now almost uninhabited and is therefore used for military manœuvres.

The lower parts of the basin are, however, very fertile, and make rich farming country similar to the Vales of Kent and Sussex, growing fine supplies of corn and fruit. The low-lying meadows along the valleys of the rivers that flow towards the English Channel make rich pastures

for dairy cattle. Many pigs are also kept, in the dairy farming districts being largely fed on buttermilk, and in the wooded areas on beech nuts and acorns. The hams and bacon of Hampshire and Wiltshire are famous.

Such a country naturally contains many small farming villages with larger market towns at intervals. Winchester, Salisbury and Dorchester, the county towns of Hampshire, Wiltshire and Dorsetshire respectively, are three large market towns. Each is situated where the river on which it is built comes on to the lowland through a gap in the chalk downs ; and in olden days the rivers were navigable for small boats to these points.

Winchester was Alfred's capital as king of Wessex, and when he became king of England it was for a time the capital of the whole country ; its name also shows that it was important in earlier Roman times. It was a favourite residence of William the Conqueror who preserved and extended the beautiful New Forest as a hunting ground. The fine cathedral also dates from Norman times.

Salisbury was built in the thirteenth century at the junction of three river valleys to replace the mound settlement and fortress of Old Sarum, which dates from pre-Roman times. The cathedral, beautifully proportioned, with tall graceful spire and pointed arches and windows, is regarded as the finest example of Early English architecture in the country.

Dorchester, as its name implies, occupies an old Roman site. It is the birthplace and residence of Thomas Hardy whose novels and poems have added greatly to the fame of Wessex.

SEAPORTS

Southampton is the largest town in this region and one of the greatest seaports in Britain. From here sail the greatest and fastest ships in the world, the gigantic "Cunard-White Star" liners, *en route* for New York with

thousands of passengers every week. For these huge vessels Southampton is specially suitable. Southampton Water is a fine, large harbour well protected from gales by the Isle of Wight, and with a curious advantage as to tides, which keeps the water deep enough at almost all hours of the day for the largest vessels to approach. This is due to the fact that when "high tide" advances

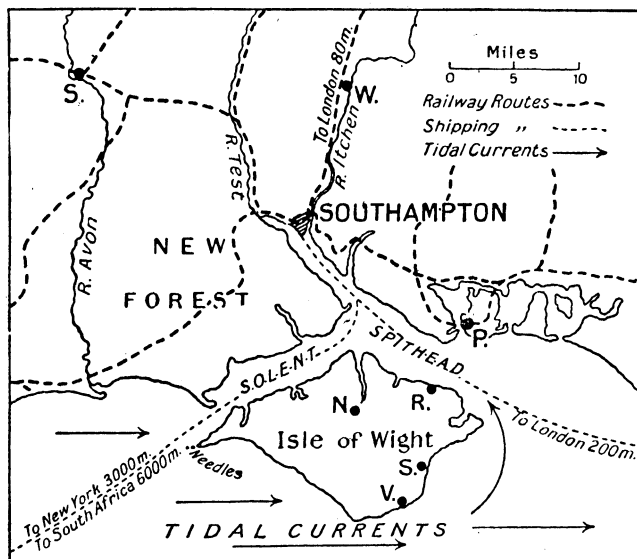


FIG. 12.—Importance of Southampton as a Port for big Liners, due to : (a) fine harbour with deep water, (b) double water front for Docks and Wharves, (c) favourable tides, (d) nearness to London. See Illustration on page 49.

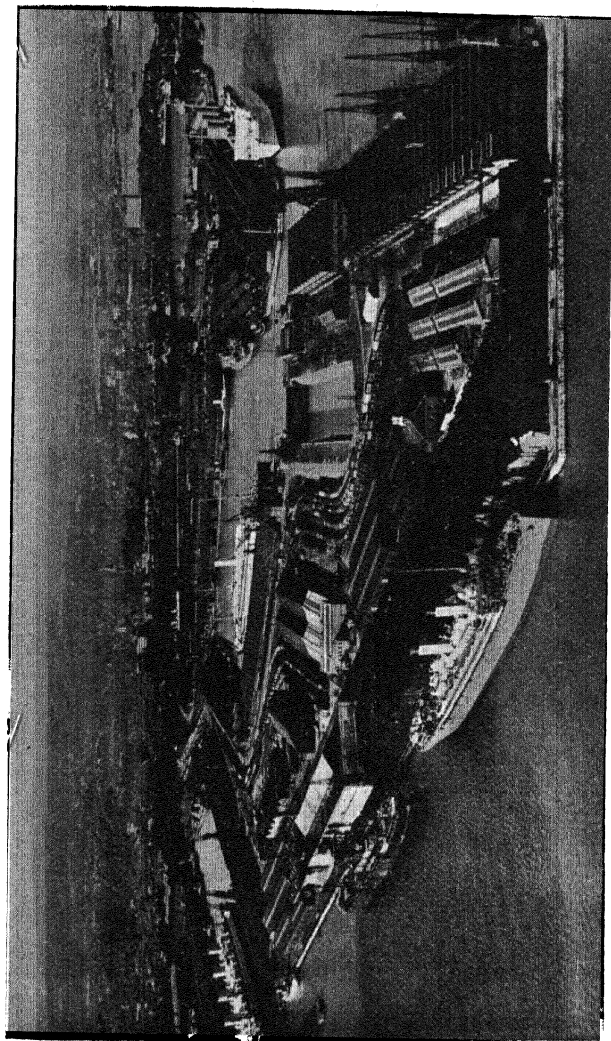
up the English Channel from the Atlantic the tidal current first sweeps into the harbour through the Solent. About two hours later, when the ebb sets in and the water level begins to fall, it is made to rise again by a tidal current up Spithead from the tide which has in the interval moved farther up the English Channel round the south side of the Isle of Wight (see Fig. 12).

The position of Southampton between the estuaries of the Test and Itchen has given a double frontage for the construction of docks and wharves where the ships may load and unload. Then also the railway route to London, to and from which the bulk of the mails and passengers conveyed by the liners are bound, is much shorter and quicker than the sea route even if the Thames estuary could accommodate the larger vessels, which, for several reasons, it cannot. Southampton is at a slight disadvantage compared with some British ports in not being near a coalfield, as most ships use vast quantities of coal to supply them with steam. But the larger modern ships, and many smaller ones, now burn oil fuel, as it takes up less room, can be loaded much more easily, quickly and cleanly, and does away with the need for so many workmen in the stokehold, the most uncomfortable part of a steamship. Nearly all the oil used in this country comes from foreign lands, and can be brought just as easily to Southampton as to any other port, so that the disadvantage in the matter of fuel is not so great as it once was. A considerable oil-refining industry has been established on the shores of Southampton Water.

Besides the liners for America the Union Castle liners for South Africa and several others use Southampton, and there is also a regular packet service across the Channel to Havre.

Portsmouth, on a fine natural harbour near the entrance to Spithead, has been a great naval station for five centuries. When it was established, and for long after, ships were mainly built of oak, which could be obtained easily from the New Forest and the Weald, and also the chief naval rivals of Britain were across the Channel and the Bay of Biscay. Its long naval traditions have enabled it to keep its place, even though ships are now built of steel and our enemies of long ago are our friends of to-day.

Weymouth, protected by the "Isle" of Portland and the long natural breakwater of Chesil Beach, is a packet



[Photo : Aerofilms Ltd.]

SOUTHAMPTON DOCKS.

Note the large liners in the open docks, and the Channel packet steamers in the smaller dock at the right of the picture. Note the warehouses and connecting railways.

station for the Channel Islands, famous as holiday resorts and producers of early fruit and vegetables. Fine limestone for building purposes is also quarried at Portland, St. Paul's Cathedral in London being the most famous building constructed of Portland stone. The marble, another form of limestone, of Purbeck in Dorsetshire is also much used in church and cathedral architecture.

Poole has a large natural harbour which, however, has become much silted up with mud brought down by the River Frome, and is only filled with water at high tide. In olden days when ships were smaller it was a very important port, but now it has only a small local trade, chiefly exporting corn and clay and importing coal.

HOLIDAY RESORTS

Beautiful country inland and fine sandy shores on the English Channel make the coast of this region very attractive to holiday makers. Its southerly position and aspect make the winters milder than in most parts of the country, and it is only a few hours' journey by rail from the densely peopled regions of London and the Midlands. So that the coast of both the mainland and the Isle of Wight is dotted with well-known seaside resorts. *Bournemouth* is much the largest of these, being a beautifully laid out town and having fine woods in addition to its excellent sands. It is also no great distance from the New Forest, the largest and most beautiful area of woodland left in Britain. *Swanage*, with the fine downland and coast scenery of the "Isle" of Purbeck; *Christchurch*, with its beautiful rivers and fine old Norman Priory; *Cowes*, the famous yachting centre on the Solent; *Shanklin* and *Ventnor* are other well-known resorts.

QUESTIONS AND EXERCISES

1. Draw sketch maps to illustrate the position of Salisbury and Winchester.
2. Find from the shipping columns of a newspaper the lines of steamships which use Southampton as a port, and the foreign countries which they serve. Sketch the routes on a map of the world.

3. How do you distinguish Norman from Early English architecture? Are there any examples of either in your own neighbourhood?

4. Try to obtain specimens of chalk and Portland stone and compare them.

5. Try to find the origin of the names Hampshire, Wiltshire and Dorsetshire.

6. It has been suggested that the Solent and Spithead are just submerged portions of the Frome Valley. Draw a sketch map showing the new coast-line and river systems, if the land were raised so that the Isle of Wight became once more part of the mainland.

7. Compare the aeroplane photograph, on page 49, with Fig. 12. In what direction is the camera facing? Which water is the River Itchen? Why have the ordinary docks no gates? Note also the cargo sheds and cargo boats alongside.

CHAPTER VIII

WESTERN ENGLAND

This region lying between the Bristol Channel and the English Channel is one of the most beautiful and interesting in the country. Its rugged and indented coasts, its high and open heather-covered moorlands, its picturesque and fertile valleys, and its mild winter climate unite to make it famous as a holiday resort for visitors from the more densely peopled and less beautiful parts of the country.

THE COASTS: FISHERIES AND HOLIDAY RESORTS

Much of the region is taken up with old hard granite and red sandstone rocks, which come to the coast in fine cliffs, as at Land's End, the Lizard and Ilfracombe. In the course of ages the sea has eaten into the rocks breaking them down into fine sand, and making numberless sheltered coves with sandy beaches ideal for bathing or for landing small boats.

The in-shore waters abound at different seasons with herring, mackerel and pilchard, so that the coast is dotted

with fishing villages, most of whose men own their boats wholly or in part, and make their living from the "harvest of the sea." Their daily battles with wind and wave and tide make them strong and courageous, so that they form a fine reserve for naval defence, as has been so often shown from the times of the Spanish Armada down to the Great War of recent years. *Brixham, Newlyn* and *St. Ives* have large fishing fleets. We should remember, too, that this region supplied the great sailors of Tudor days who sailed from Bristol and Bideford, Plymouth and Falmouth to the discovery of the New World, laying the foundation of the overseas Empire of Britain to-day.

Notice what fine natural harbours are formed at the mouths of some of the rivers, probably due to the sinking of the land at some early time, letting in the sea to flood the lower valleys. The towns of Falmouth, Plymouth, Dartmouth and Exmouth have grown at the estuary of the rivers whose names they bear.

The fine coast scenery and mild winter climate of the Cornish coast have led to its being called the Cornish Riviera, but it is really much more like the coast of Brittany than of the Mediterranean coast of France.

Famous holiday resorts in this region are too numerous to mention, but a glance at the map and reference to the posters of the Great Western and Southern Railway Companies will call many to mind.

THE MOORS : MINES AND QUARRIES

Dartmoor, which covers more than a third of Devonshire, is the largest of these. It consists of a great mass of granite rocks, rising in Yes Tor to over 2,000 feet above sea level. The ascent to the moor is by steep and winding roads or river valleys, and the scenery of the upper parts is wild and desolate. Most of the moor is covered with grass and heather, giving glorious colours to the landscape in early summer. Here and there rise the tors, great bare piles of grey granite commanding glorious views on

fine days, and near them in many parts can be seen great stone circles and other monuments marking the encampments of our Stone Age ancestors who were driven from the valleys by stronger invaders. Theirs must have been a hard life, for nothing of any value can be grown, and even now the pasture only keeps small flocks of sheep and tiny wild and shaggy Dartmoor ponies which are rounded up from time to time to be sold for underground



[Photo: G.W.R.]

HAYTOR ROCK, DARTMOOR.

A typical tor of weathered granite. Note the very thin soil covering of the moor, which at this point is about 1450 feet above sea level.

work in mines ! The winter climate at this height is also severe, and at all times the moor is liable to mist and fogs and rainfall caused by the cooling of the moist sea air as it rises over the heights.

But here and there through the granite of Dartmoor, Bodmin Moor and the smaller moors of Cornwall run black veins of tin ore which have been a source of wealth from very early days. The ancient Phœnicians from the

eastern end of the Mediterranean are known to have come to Cornwall to buy this tin to mix with the copper they mined in Cyprus, in order to make bronze for their vessels and weapons. The tin ore was washed from the granite by the many streams which carry the heavy rainfall of the moors to the sea, and could be obtained by the old tin streamers by sifting the soil of the stream beds. Later on, when better tools could be made, the veins were dug from the rocks and now steam dredgers are used to dredge up the deposits at the mouths of the larger rivers to recover tin ore.

There were also veins of copper ore in the granite; and both copper and tin ore used to be sent to South Wales for smelting with the abundant coal found there, and of which we shall learn later. But both metals are now almost worked out, and the Cornish miners have suffered very severely. Many of them have emigrated to parts of the Empire and foreign countries where their experience of mining is most valuable in opening up the mineral resources.

In some places the granite is quarried for "road metal" to make roads for heavy traffic over the softer soils of the fertile plains and valleys, and also in larger blocks for building docks and wharves. Houses and churches of the few villages in the valleys among the moors are also mainly built of granite. On the south side of the moors, where the granite has suffered more weathering from rain and frost, some of the granite has decomposed, leaving great beds of white clay, which makes the water of the streams quite milky. This kaolin, as the white clay is called, is very useful for making fine porcelain, and along the valleys of the Teign, the Fowey and the Fal are several china-clay works. The clay is washed out by powerful jets of water and the milky liquid is then allowed to flow into tanks where the clay settles to the bottom. The water is drawn off and the china clay can then be cut out in convenient-sized blocks

for transport. Truckloads of this kaolin can be seen on the railways ; and in the harbours, especially at Fowey, vessels may be seen being loaded with it. Most of it is sent into Staffordshire to the Potteries, some is made into china ware in Devonshire, and other is exported for use in various industries.

•Clay on the moors is also responsible, with the heavy rainfall, for the bogs, which are a great danger to men and animals wandering over them, especially in misty weather. Paths and roads are very few and houses and people fewer still, so that the stranger who roams the moors without map and compass runs considerable risks.

Exmoor, in Somerset and North Devon, is a mass of old red sandstone and slaty rocks not quite so high or so desolate as Dartmoor, although it has few trees and is mainly covered with heather and bracken. Red deer and small ponies run wild, and streams tumble to the sea through picturesque wooded valleys or "combes," such as those so well described in *Lorna Doone*. From Dunkery Beacon, the highest point, magnificent views of the wild and uninhabited moorland and the rugged coast may be obtained, while on fine days the mountains of Wales may be seen across the blue expanse of the Bristol Channel. The Quantock Hills are just a separated fragment of Exmoor.

The Mendips are a fine mass of limestone hills containing some wonderful natural caves dissolved out by underground streams. The water dripping from the roofs of the caverns has built up beautiful stalactites which hang in places like huge icicles and in others as draped curtains of shining rock. From the floor beneath them pinnacles of limestone, called stalagmites, have been slowly built up in a similar way. Stalactites meeting stalagmites in places give the caves the appearance of huge vaulted halls carved in the rock, their roofs supported by glistening pillars. The celebrated Cheddar Gorge, where limestone cliffs rise several hundred feet above the level of the sea, is one of the most remarkable of the Mendips.

main road, is supposed to have originated by the collapse and removal of the roof of one of these natural caverns. In the days of the Armada "rugged miners poured to war from Mendip's sunless caves," but the lead ore which used to be mined there is now worked out.

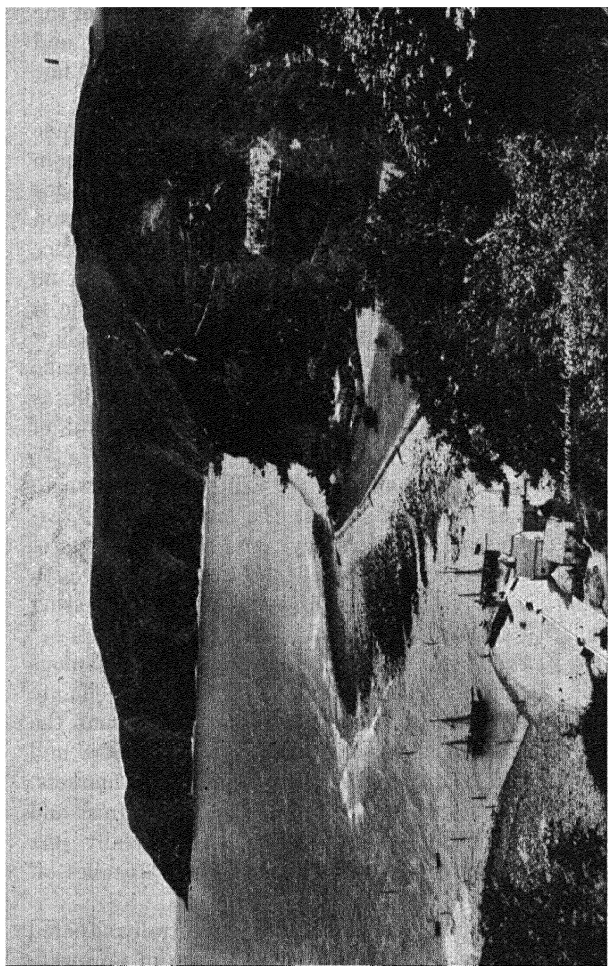
The Blackdown Hills provide dry pastures for sheep, which supplied wool for the once famous carpet industry of *Axminster* and skins for the glove-making of *Yeovil*.

THE VALES : DAIRY FARMS AND ORCHARDS

Between the moors and hills lie peaceful and fertile vales through which the rivers from the moors wind slowly to the sea.

The Vale of Somerset, drained by the Parret and its tributary the Tone, was once largely marshland, but a drainage scheme has turned the sedgy swamps of Sedgemoor into fertile cornlands where oats and barley and root crops and even wheat may be grown. Fine pastures feed the cattle from whose milk Cheddar cheese is made, and Somerset is also noted for its cider apples. *Taunton*, in the richest part of the region and commanding many routes between the hill masses, grew to be the chief market town and has become the county town of Somerset. Modern railways following the old roads have added to its importance, and it is now a great junction for lines to London, Bristol, Exeter and the holiday resorts of North Devon and Somerset. Other market towns are Wells, which has a fine cathedral, and Yeovil.

The Vale of Devon, watered by the Exe, is a land of rich red soil with red cattle and rosy apples, so that Devonshire cream and cider have become world-famous. *Exeter*, a fine old city dating from at least Roman times, as its name indicates, is the great centre of the region and the county town of Devonshire. It grew on the slopes of a hill overlooking the Exe at the farthest point from the sea that could be reached by the small ships of ancient times, and at the point where the river was narrow enough



[Photo. G.W.A.]

LYNMOUTH : HARBOUR AND FORELAND.

The mouth of the river Lyn which has cut a deep and picturesquely wooded valley into the old hard rocks of Exmoor. What sea is shown in the picture ? In what direction is the camera facing ?

to be bridged, so that land and water traffic met at this point. The market flourished under the protection of the castle on the hill, and in later days the security and wealth of the region led to the building of the fine cathedral, which dates from Norman times.

Besides the great old Roman road, called the Fosse Way, which ran in a straight line across the country from Exeter through Bath and Leicester to Lincoln, coast roads from east and west, and the road between Exmoor and Dartmoor, converged on the city, adding to its importance (see Fig. 13). At the present day, although it can no longer be regarded as a seaport, and its river traffic is small, all the old roads, and the railways which follow them closely, bring people and goods to the city and make it one of the most thriving market towns in Britain, as well as one of the most interesting and beautiful of cathedral cities.

The Vales of Taw and Torridge will be well known to all readers of *Westward Ho!* as the home of the "seadogs" of Queen Elizabeth's days, and the quaintness of some of the old-world villages of this beauty-spot of North Devon has not yet been quite spoilt by their increasing popularity as holiday resorts.

The Vales of Cornwall and the coastal plains are famous cattle pastures, the heavy rainfall and mild climate keeping the grass luxuriant practically throughout the year. The mild winter also enables early flowers and vegetables to be grown for London and other markets. This trade is shared by the Scilly Isles, where frost and snow are almost unknown, and which are really just isolated fragments of Cornwall lying about 30 miles off Land's End.

Bodmin, on the Camel, and the most centrally situated market town, has become the county town of Cornwall, although the cathedral city of *Truro* is larger. *Launceston* is the market town of the Valley of the Tamar, the river which marks the boundary between Devon and Cornwall.

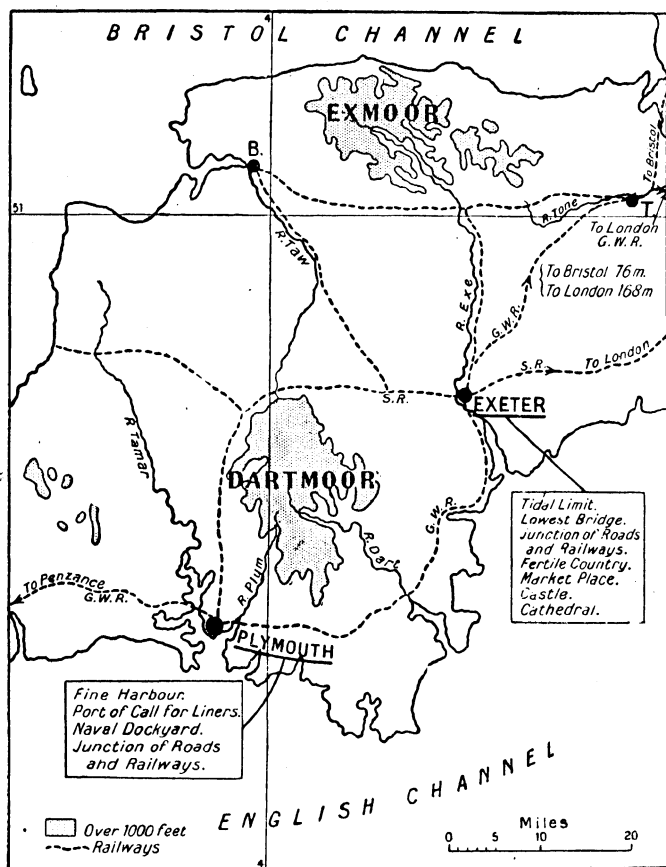


FIG. 13.—Importance of Exeter and Plymouth.

MODERN SEAPORTS

The two largest towns of the whole region are the ports of Bristol and Plymouth, and a consideration of the reasons for the growth of these is very instructive.

Bristol was once called *Brigstowe*, which means "the bridge place" and suggests the point on the River Avon at which it commenced to grow as a market for the fertile plains around it. Like *Exeter*, too, it was at the navigation limit for the small ocean-going vessels of olden times. Even now on the very high tides (which are caused by the rapid narrowing and shallowing of the Severn estuary) small cargo ships reach the city docks, but for really large vessels new docks have been constructed at Avonmouth. Old roads from the Midlands via the Severn Valley, from London by the Thames, Kennet and Avon Valleys, and from *Exeter*, converged on the bridge at Bristol, adding to its importance, and it carried on, as it still does, a trade with Ireland in dairy produce and with Spain in wine. But its rapid growth to fame came with the discovery of the West Indies and America and the enterprise of its "merchant venturers," who took advantage of the favourable situation of the port to develop the trade in sugar and cocoa and tobacco with those new lands. Bristol is still famous for cocoa and tobacco. With the invention of steam-driven machinery and ships Bristol was able to hold its own, for it has quite near it a small coalfield to provide the necessary fuel. So that to-day, with its industries and its trade, it supports over 400,000 people.

Plymouth, with over 200,000 people, is both a naval and a commercial port, the naval dockyard being at Devonport on the broad and sheltered Tamar estuary, in which all types of warships may always be seen at anchor. Its naval importance dates from the days when our enemies lived across the Channel, and when Drake and other Devonshire sailors set out on their voyages of discovery and conquest. From its harbour also set out the Pilgrim Fathers to the colonization of the New World and the foundation of the now powerful United States of America.

As the district behind the port has no great industries and population, and as *Liverpool*, *Bristol*, and *Southamp-*

ton are nearer to the great and busy centres of the country, the commercial importance of Plymouth is small, but some vessels from India and America *en route* for London call to land passengers and mails, which can be conveyed more quickly from there to the capital by railway than by the longer sea route through the Straits of Dover. Plymouth also sends out steam trawlers for deep-sea fishing in the Channel.

QUESTIONS AND EXERCISES

1. Contrast the lives of a Cornish miner and a Cornish fisherman. What are the relative advantages and disadvantages of each?
2. The coast of Cornwall is sometimes spoken of as "The Cornish Riviera." Why? In what respects is it like or unlike *the* Riviera?
3. Try to obtain specimens of granite, old red sandstone, kaolin, copper ore, tin ore, and examine them.
4. Find on a map how kaolin would reach the Potteries in Staffordshire—(a) by rail, (b) by water.
5. Draw sketch maps to show reasons for the growth of Taunton, Bristol, Exeter and Plymouth.

CHAPTER IX

THE MIDLANDS

This name is given to the region of England that lies roughly between the Trent, the Severn, and the Chiltern Hills. A journey across the Midlands, say from London to Birmingham, by road or rail, shows quite clearly five very different kinds of country—the chalk hills of the Chilterns, the rich vale of Oxford, the limestone hills of the Cotswolds and Edge Hill, the fertile vale of Evesham, and the Midland Coalfield (*see* Fig. 14).

THE CHILTERN

These rise very gently from the lower Thames Valley to a height of about 600 feet, through rich farming country freely sprinkled with beech woods, which thin out towards the crest, where the rounded slopes covered

with short springy turf remind us at once of the Downs. Like the Downs they are used as sheep pastures, and in places the turf has been cut away, exposing the white chalk, which is dug out for lightening heavy clay soils in the valleys or to be burnt in kilns to make lime for building purposes.

From the crest of the hills there is a very steep drop or escarpment to the lowland on the north-west, and on this bold face of the hills in several places may be seen huge white horses and other designs formed by carefully removing the turf.

Roads, railways and the Grand Union Canal cross the Chilterns in natural gaps, often deepened by cutting away

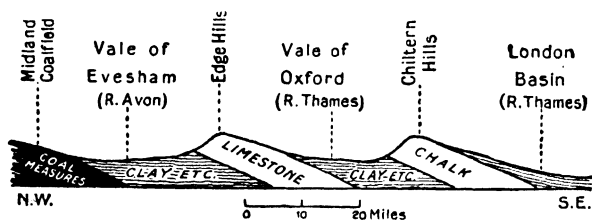


FIG. 14.—Rough Section from London to Birmingham, showing natural regions. Note gentle “dip slopes” to East and steep “escarpments” on West face of hills.

the chalk to reduce the gradient (*see* Fig. 15). The Great Western Railway route to Birmingham goes through the gap at Wycombe, where the local beech woods have given rise to chair and brush-making industries. The North Western route of the London, Midland and Scottish Railway and also the Grand Union Canal use the Berkhamstead Gap, while the Midland route uses the Lea Gap, passing Luton, famous for its straw-hat industry. In the railway cuttings the vertical cliffs of chalk may easily be seen, for, although their whiteness may be dimmed with smoke from the engines, they are so porous and hold so little water that they do not readily become overgrown with plants. In some of these cuttings the long straight

layers of black flints may be seen in the chalk, and in the villages of the chalk districts houses and even churches are frequently built of these hard flints. Chalk crumbles too easily under the action of rain and frost for it to be used as building stone, but some chalk is hard enough for

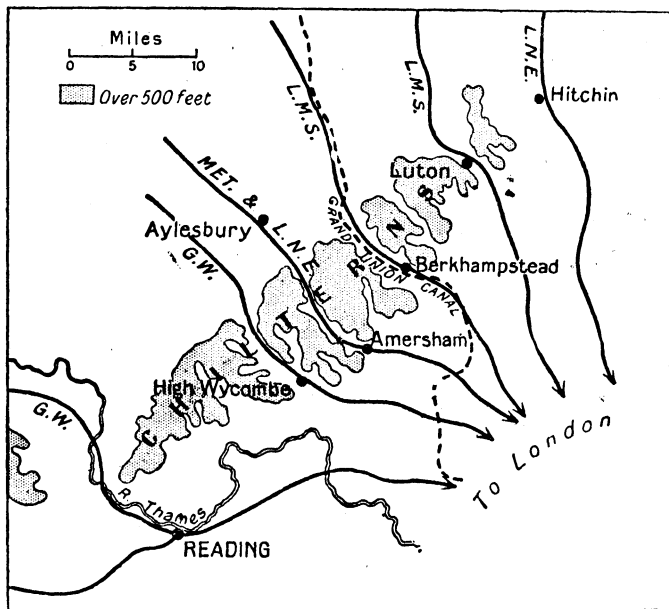


FIG. 15.—The important natural gaps through the Chilterns and Railways using them to reach London. Note gap towns, also Grand Union Canal Route.

interior work, as may be seen in the beautifully carved screen in St. Albans Cathedral.

THE VALE OF OXFORD

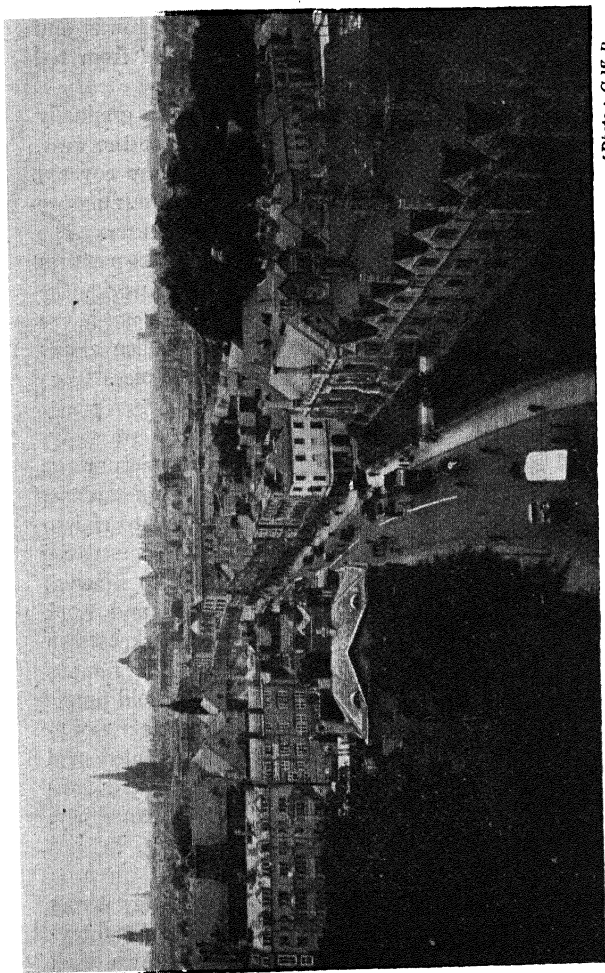
This is a fertile lowland of rich clayey soil drained by the Upper Thames and its tributaries and many other small, slow-flowing, winding rivers, whose peaceful courses through green meadows and woodlands make some of the

pleasantest English scenery. It is a farming country specializing in dairy cattle, as the damp clay soil produces fine rich grass and enables root crops to be grown for winter food. London on the one side and the busy Black Country on the other provide large markets for the milk ; and the Great Western Railway through this district has sometimes been spoken of as "The Milky Way" on account of the large number of special milk trains that traverse it daily.

Oxford is the largest of the many old market towns of this region. It was centrally situated and, as its name shows, at a point where the Thames (or Isis, as it is always called at Oxford) could at one time be crossed on foot. The Cherwell also joins the main stream at this point, and along its valley has been constructed the Oxford Canal from Birmingham. In the peaceful old market town was also established the ancient University whose colleges are famous alike for their beauty and for the distinguished men who have studied in them. The city was on the old road westward from London, through the Wycombe Gap in the Chilterns, and in London this road is still called Oxford Street. Old roads and modern railways also connect it with Southampton, Gloucester and Worcester, Birmingham and Cambridge. The neighbouring town of *Cowley* has recently developed a large motor-car industry.

THE COTSWOLDS

These and their continuation, Edge Hill and the Northampton Uplands, consist of a limestone harder than chalk, but which like it was formed ages ago at the bottom of a deep ocean, and consists of the skeletons of myriads of sea creatures. For this reason also there may often be found in the limestone shells and other fossil remains of considerable size. The limestone of the Cotswolds is similar to that quarried at Portland, and can be used for building purposes. Bath and many other towns and villages in this region are built of the



[Photo: G. W. R.]

OXFORD, LOOKING UP HIGH STREET FROM MAGDALEN BRIDGE.

Here the main road from London crosses the River Cherwell and enters the city. Notice the many colleges of the University, the University Church with spire, and the dome of the Radcliffe Library.

stone, and slabs of it are also used for roofing, so that these places look very grey compared with towns and villages where red sandstone or bricks made from red clay are common building materials.

Like the Chilterns these hills slope fairly gradually from the eastern side and then drop sharply to the west. Like the chalk hills, too, their upper parts are covered with short green turf, and owing to the porous nature of the limestone make good dry sheep pastures. The long-woolled Leicesters and Cotswolds fed on these pastures are among the finest breeds of sheep in the world, the former being famous for their fine fleeces. *Stroud* is the chief centre for the manufacture of fine woollen cloths as used for liveries, uniforms and billiard tables.

THE VALE OF EVESHAM

This is a fertile lowland famous for its picturesque meadows and woodlands, its orchards and hop-gardens. The Warwickshire Avon traverses it from end to end to join the Severn at Tewkesbury, and along it passed the old Roman Fosse Way leading from Exeter to Lincoln. This also is Shakespeare's country, his life and work having made world-famous the little old market town of *Stratford-on-Avon* in which he was born. Other famous towns in this region are *Rugby*, with its great old public school and modern electrical engineering works; *Leamington*, a beautiful spa; *Warwick*, with its stately mediæval castle; *Evesham*, well-known for its orchards and jam-making; and *Tewkesbury*, with its fine old Norman abbey.

THE MIDLAND COALFIELD

After crossing the limestone ridge on a journey across the Midlands from the south-east the pleasant countryside is broken every few miles by a large town with closely packed houses, smoky factory chimneys, tall iron blast furnaces which send out flames and, if seen after dark, cast a lurid glare for miles around, ugly black

scaffolding supporting the huge winding wheels above the shafts of coal and iron mines, and enormous heaps of refuse cast out from the mines or furnaces.

These blots on the landscape are the busy manufacturing districts which have grown up with the use of coal for smelting iron and driving machinery. The whole area is called a "coalfield," because beneath the surface at various depths are to be found great layers or "seams" of coal, 2 or 3 feet thick, and often miles in extent. Where the seams are nearest the surface or of sufficient thickness "shafts" have been bored through the overlying rocks to reach them, and there the miners work night and day digging out wide roads and narrow passages in the coal mine. When a mine has been worked for some years the miners may have a mile or two to go to their work after leaving the "cage" in which they are lowered to the bottom of the shaft.

In any one mine there are usually several seams of coal sandwiched between thick layers of shale and other rocks, so that the shaft of a coal mine is often more than a thousand feet in depth. For ventilation of the underground workings and for safety there are always at least two shafts to a mine. The coal and rock that are hewn out are loaded on small rail trucks drawn along the "roads" by electric power or by ponies, who spend almost all their lives below ground. The trucks run into the cages and are hauled up the shaft by steel cables passing over the winding wheels to the engine-room near the mouth of the shaft. After being weighed and emptied on to a dump or into railway wagons the trucks are returned to the pit, sometimes laden with "pit props," pine logs about 6 feet long imported from Canada or Newfoundland or Scandinavia. These props are used to support the "roof" of the mine from beneath which the coal has been dug out.

The miners face many risks of injury or worse from falling rock, from natural coal-gas which forms an ex-

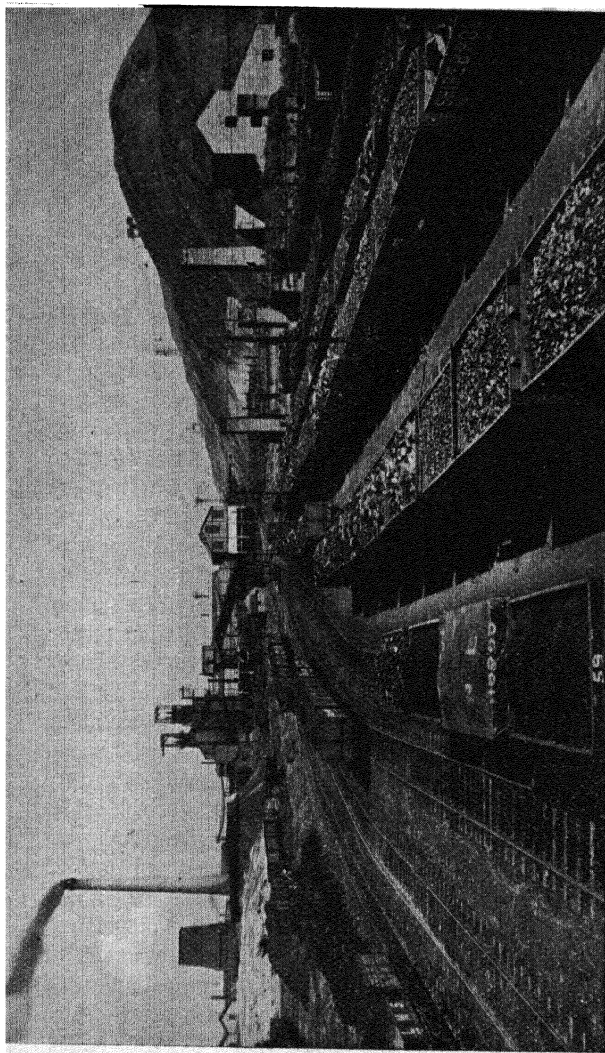


Photo: Will F. Taylor.

SHIREBROOK COLLIERY, DERBYSHIRE.

Notice the electric power-station with chimney, the pithead winding gear, the rubbish tip served by a wire-rope railway, and the many trucks laden with different grades of coal.

plosive mixture with air, and from water which, soaking through the overlying rocks, may flood the workings. There are almost a million coal miners in Britain and they dig out about 250 million tons of coal a year. If we think for a moment of the many ways in which we are dependent upon coal we shall appreciate better our debt to these miners who, in spite of all precautions, have one of the hardest and most unpleasant jobs in the world.

Much of the Midland coal is used for smelting iron in the blast furnaces. In several parts of the "Black Country," as South Staffordshire is aptly called, iron ore is obtained from the same mines as the coal. The tall steel towers called blast furnaces are lined with fireclay, which is also found in the Midlands and which can withstand great heat. Into the top of the furnace are tipped truck-loads of coal, iron ore and limestone, and a blast of hot air is blown in at the bottom. The impurities of the ore mix with the limestone, forming a molten mass of "slag" very like volcanic lava. This floats on top of the heavier white-hot molten iron, which is run off from time to time from the bottom of the furnace into troughs of suitable shape and size lined with sand. The "pigs" or lumps of iron thus formed can be taken to iron foundries for making various articles of cast or wrought iron, or to steel works, where the iron is converted into the harder and less brittle form of steel.

The towns of the Black Country, of which *Birmingham*, a great city of a million people, is the chief centre and market, specialize in metal work of all kinds, from the making of pins to the making of railway locomotives. Birmingham itself is famous for rifles and ammunition, railway rolling stock and motor-cars. It also has a large manufacture of rubber articles, especially tyres, while in the "garden suburb" of Bournville, cocoa, chocolate and confectionery are produced. *Wolverhampton* makes much machinery and is also famous for locks and keys.

Coventry has great motor and cycle industries, *Rugby* electrical workshops, and *Dudley* chain-making factories. *Redditch* is noted for pins, needles and fish-hooks, and *Oldbury* for railway wagons and carriages.

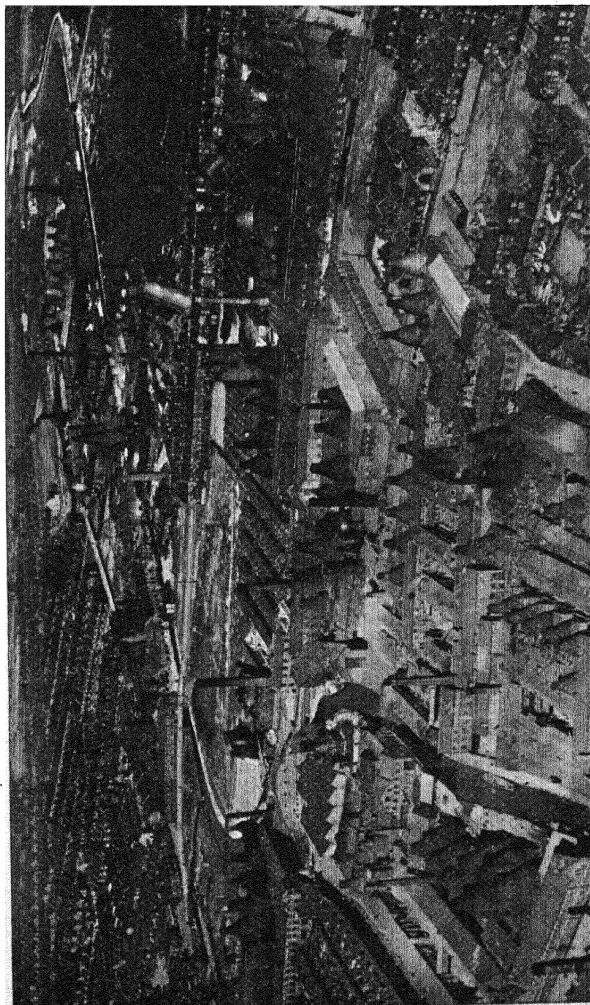
The part of the coalfield in North Staffordshire is called "The Potteries," for there, around *Stoke-on-Trent* and "the five towns" of which it is the centre, most of the coal is used in making earthenware and fine porcelain articles for use and ornament. The cups, plates, vases, sanitary ware, electrical insulators, etc., are all modelled first in some form of clay and then baked hard by coal fires in the great ugly brick kilns which are the outstanding objects in the Pottery landscape. Glazing and decoration where necessary are later processes, each of which involves another period of heating in the kilns. Much of the potter's clay is found locally, but the white kaolin, from which the fine porcelain is made, is brought from Devon and Cornwall by rail, or by ship to the Mersey, and then in barges along the Trent and Mersey Canal.

Worcester and *Derby*, although not in "the Potteries," have also fine porcelain industries.

Leicester, although as its name shows it has been important since Roman times, has grown to be a great modern industrial town owing to its nearness to a coalfield. It is famous for its woollen hosiery made from the fine fleeces of the sheep reared on the limestone hills to the south and east.

Nottingham, an old Saxon settlement around the Castle Hill overlooking the Trent, which is navigable for small boats to that point, has become a great manufacturing centre owing to the local coalfield. It is famous for its fine lace and also makes cycles and prepares tobacco. It has a very large market-place, where the products of surrounding farms and factories are sold.

Derby has already been mentioned. It is an old Danish settlement on the Derwent, and has developed from an agricultural market town to a busy manufacturing centre



[Photo: Aerofilms Ltd.]

A SCENE IN THE POTTERIES, NEAR HANLEY.

Note the conical kilns in which the pottery is baked, the furnace chimneys, the densely packed houses of the workers, and the canal.

owing to the local coalfield. Owing to its central position it was chosen by the old Midland Railway as the centre for making and repairing its rolling stock. Main lines radiate from it to London, to Birmingham and Bristol, to Manchester and Liverpool, to Sheffield, Leeds and Carlisle.

Northampton and *Stafford*, situated on heavy clay lands suitable for cattle pastures, have developed leather industries, tanning the hides with the bark of oak trees, which also grow well in these districts. In modern times, with factories turning out boots and shoes much more rapidly, hides and tanning materials are imported from abroad in large quantities, but the industries remain in their original centres owing to the fact that coal for driving the machinery is close at hand.

Burton-on-Trent, with supplies of excellent water, the chief constituent of beer, and within easy reach of districts growing barley, from which malt is made, and hops used in flavouring the beer, has developed a large brewing industry. The many large towns of the Midland coalfield form a good market for its products.

Gloucester, an old Roman centre and market town at the lowest bridge point on the River Severn, has become an outlet for the Midland coalfield by the construction of a ship canal to the estuary of the river.

In all these busy towns of the Midland coalfield (*see* Fig. 16) many thousands of people are employed in factories of various kinds and the offices connected with them. As the towns have all grown up hurriedly within the last 100 years with the discovery of the use of coal for smelting iron and driving machinery, and the work-people like to live fairly close to the factories, as rapid means of locomotion are of comparatively recent development, these towns are often very crowded and squalid. The work in the factories is also often very monotonous, one person being engaged in looking after the same machine for months and sometimes years together. But

hours of labour are shorter and wages are higher than those of the farm workers, who also suffer more from bad weather conditions ; so that for these reasons many

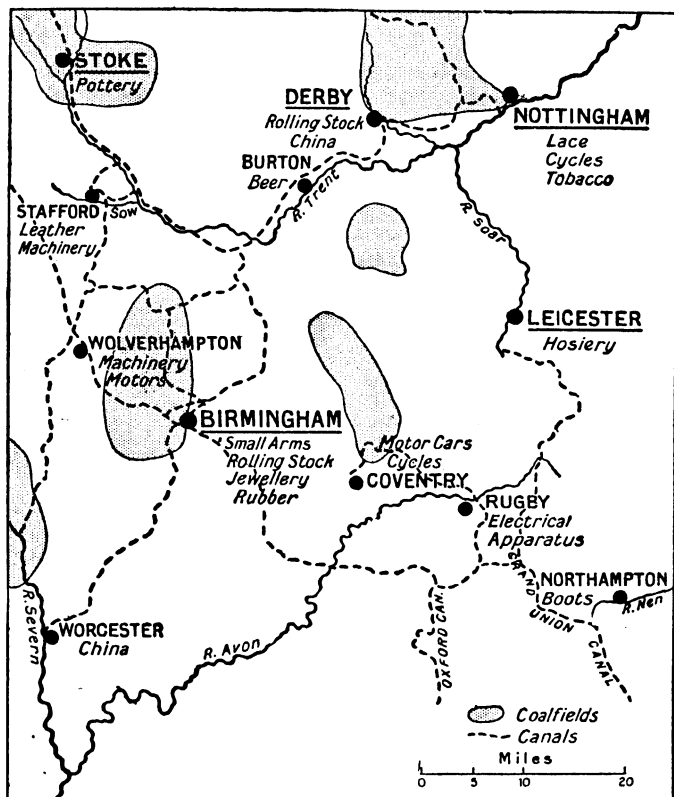


FIG. 16.—Industrial Centres and Waterways of the Midland Coalfields.

folk prefer to put up with the conditions of town life, seeking evening amusements and annual holidays by the sea, which are hardly dreamt of by real country folk, whose daily life, if simpler, is probably much more healthy.

But in the future, if more thought is given to town planning and organization, and when science has been used to make factory life cleaner and transport more rapid, there may come a time when the advantages of both town and country life will be shared by all who take their share in developing the resources of the country.

QUESTIONS AND EXERCISES

1. Draw a sketch map of the Midlands showing (1) the chalk and limestone ridges, (2) the clay vales, (3) the Midland coalfield.

2. Draw a sketch map showing the position of the rivers and towns mentioned in this chapter.

3. Show by a sketch map the reasons for the growth of (a) Birmingham, (b) Nottingham, (c) Derby, (d) Gloucester.

4. Write a list of the chief purposes for which coal is used.

5. What different types of workpeople are to be found in various parts of the Midlands: what does each do for his living?

6. Try to collect specimens of chalk, limestone, iron ore, kaolin, flint, and notice their different characteristics.

7. Fig. 16 shows most of the large canals at present in use in England. Why were they mainly constructed in the Midlands? What are the relative advantages of a canal and a railway? Why are canals falling into disuse in England?

8. What evidence can be found on a map that Romans, Saxons, Danes and Normans have at various times occupied the Midlands.

9. Which counties would you consider the Midland counties of England?

10. Describe the country you would see from a train travelling from London to Crewe by the L.M.S. route.

CHAPTER X

EAST ANGLIA

BRITAIN'S GRANARY

This name is sometimes given to the parts of England that lie between the Humber and the Thames Estuary. It is lower and flatter and has hotter summers, colder winters, more sunshine, and less rain than any other part of the British Isles of similar extent. Added to

this, its soil consists mainly of fertile clays, so it is easy to understand why this is the great corn-land of the country. For the grain crops need a stiff soil to support their tall slender stems, they require enough but not too much rain to make them grow, hot and sunny summers to ripen the grain, cold winters to kill off grubs and insects. The flat lands made it easier for the farmer to carry out the ploughing, sowing and reaping, whether he does these things with horse-drawn machines or motor tractors, which are becoming more common.

1. Barley 2. Clover 3. Wheat 4. Roots	1. Clover 2. Wheat 3. Roots 4. Barley
I	II
IV	III
1. Roots 2. Barley 3. Clover 4. Wheat	1. Wheat 2. Roots 3. Barley 4. Clover

FIG. 17.—A Four-Years' Rotation of Crops on the Four-Field System.

Experience has shown that even with good supplies of manure it does not pay to grow the same crop on a field year after year, so that a farmer usually divides his land into four. On one quarter he grows barley for the first year, a green crop like clover the second year, followed by wheat or oats the third year, and turnips or some similar "root crop" the next. The other fields follow a similar rotation, so that in any one year there are two grain crops and two "fodder" crops growing on the farm (*see* Fig. 17). Occasionally a field is allowed to lie "fallow," i.e. with no crop growing upon it, for

a year. In East Anglia the relatively scanty rainfall (about 25 inches per annum) is ideal for the growth of wheat, so that wheat is always one of the four crops, whereas in wetter parts of the country oats are grown instead. Thus East Anglia is the chief wheat-land of the country (*see* Fig. 18). It should be remembered, however, that only about one loaf of every five eaten in Britain is made from the flour of home-grown wheat.

After the corn is reaped in harvest-time it is carted to the farmyard and stacked as soon as possible in order

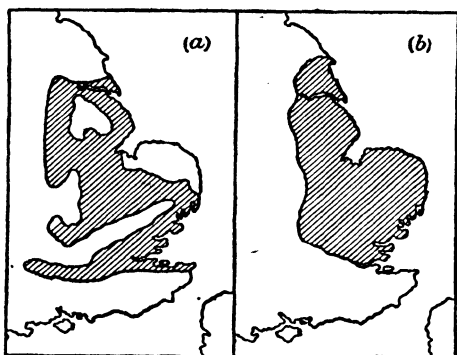


FIG. 18.—The Cornlands of East Anglia : (a) Areas of Britain with less than 25 inches of rainfall annually, (b) Areas of Britain where more than half the land is cultivated and where more than one-tenth of the land grows wheat.

that it may be protected from rain until the farmer is ready to thrash it. This is usually done in the stack-yard by steam-driven machinery kept or hired for the purpose. The grain is then stored in the barns until it is sold to the miller for grinding. The millstones which grind the corn into flour are driven by wind, water, steam or electric power, and the mills are therefore usually situated on hills or by running streams or on river estuaries where coal can be cheaply brought from a coalfield in ships. The larger and more powerful steam

and electric mills are now almost entirely displacing the picturesque windmills and water-mills of the country districts.

The straw from the thrashing machines is used as bedding for the cattle in the sheds and yards, where the beasts are kept during winter months and fed on the root crops grown on the farm. At the end of the winter the sheds and yards are cleaned out and the tons of refuse that have accumulated are carted out to the fields as a valuable manure, thus returning to the land some of the materials that the growing crops take from it.

In East Anglia there is not sufficient rainfall for good pasture, so that the farmer does not keep many cattle permanently. He buys cattle after harvest, keeps them in the yards all the winter, and then sells them to the butcher or to graziers in the wetter western districts in the spring.

THE FENLAND

This is a very interesting district of the region as it has been reclaimed from swampy marshes. Much of it is only a few feet above sea level and is protected from flooding by sea and rivers by means of broad earth walls called "banks." The rivers Witham, Welland, Nen, Great Ouse and their tributaries, that wind sluggishly through the Fens to the Wash, flow above the level of the surrounding fields, and great care has to be exercised to ensure that, after heavy rains, the "banks" do not burst, for such an occurrence is a tragedy to all the farms within a mile or more. As the rain cannot run from the fields into the rivers the fields are divided into sections by "drains"—long, straight ditches—all of which lead to a main drain alongside a "bank." At every two or three miles a steam-pumping engine is situated to lift the surplus water from the drains into the river.

The reclaimed Fenland has a rich black soil which grows heavy crops of corn and potatoes, and in one or

two parts, as around Wisbech and Ely, the growing of fruit and sugar beet has been taken up with great success.

It is interesting to note that the drainage of the Fens was carried out by Dutchmen brought over from Holland by the Duke of Bedford. Their experience in reclaiming land from the sea and protecting it from floods, without which work there would be little of Holland, was of great value.

VILLAGES AND TOWNS

A rich farming country like East Anglia has always supported a considerable number of people, and, indeed, until the eighteenth century it was one of the most thickly-peopled areas of the country. But, of course, the farming population was spread out in small villages and not crowded together in towns as around the mines and factories that have sprung up on the coalfields. As we have already seen in Southern England, some of the villages more favourably situated for communication than their neighbours grew to be market towns for a circle of surrounding villages, and most of the large towns of this region are old market towns and cathedral cities, situated at the tidal limit or suitable bridge-point on a river. Such are *Lincoln*, *Norwich* and *Peterborough*. Some specialized in making implements for farm use and, with the increase in the use of machinery, have become busy manufacturing towns, making agricultural implements not only for East Anglia but for other parts of the country and the world. Ipswich is famous for this industry, but the three cities mentioned above also have well-known factories. Ipswich also has large flour mills importing coal from Newcastle for power and also shiploads of colonial and foreign grain to supplement the home supplies.

The chalk hills of the East Anglian heights and the Lincoln Wolds and the limestone of Lincoln Edge support many sheep, and both Norwich and Lincoln once had woollen industries learnt from the Flemings who came

across the North Sea in the Middle Ages. With the increasing use of machinery demanding plenty of coal these industries have left East Anglia for the coalfields of Yorkshire. Norwich now prepares locally grown and

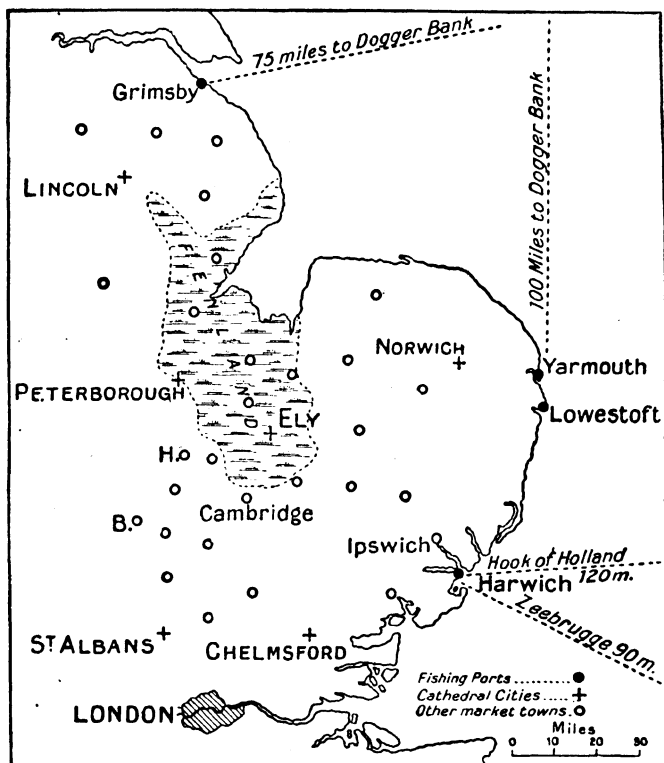


FIG. 19.—Fishing Ports, Cathedral Cities and other Market Towns of East Anglia.

imported mustard seed for table use, and makes starch from imported rice.

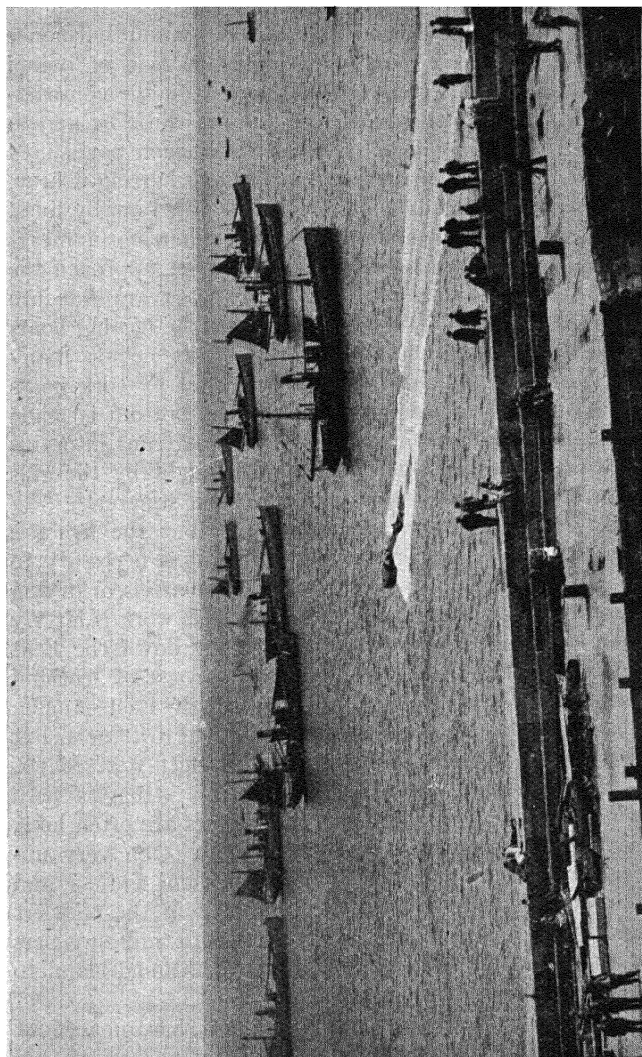
Cambridge and Huntingdon, like Peterborough, grew up as market towns on the edge of the Fenland, and

the establishment of the famous University at Cambridge has greatly increased its importance. A beautiful cathedral crowns the *Isle of Ely* which rises out of the Fenland and which was a fertile, prosperous and protected area before the marshes were reclaimed. It was here that Hereward and his Saxons held out for many years against the Normans until a "causeway" was built across the Fens.

THE FISHING INDUSTRY

The finest fish in largest quantities are found in shallow seas in cool, temperate parts of the world; and the North Sea, which is hardly anywhere deeper than 300 feet, is one of the best fishing grounds in the world. In the middle of the North Sea about 100 miles from the east coast of Britain the Dogger Bank, an area about as large as Wales, rises to within 100 feet of the surface. Over the Dogger live swarms of cod, haddock, whiting and hake, and also of many varieties of flat fish, such as plaice, turbot and soles, which spend much of their time resting on the bottom of the sea.

From *Grimsby*, *Yarmouth* and *Lowestoft*, on the coast of East Anglia, hundreds of boats called "trawlers" go out to gather in this harvest of the sea. The trawls are large bag-shaped nets often 100 feet long and attached to a beam measuring 50 feet so arranged as to keep the mouth of the net open. They are lowered over the side of the vessel and dragged slowly along the sea-bed, thus disturbing the fish, which are swept into the trawl and are prevented from escaping by an ingenious net valve. At intervals the trawl is hauled up by a windlass and the lower end of the net is opened, tipping out the "catch" on the deck of the trawler. The fish are then sorted and packed in boxes with ice to await the fast steam "carriers" which visit the trawling fleets daily. These bring the supplies into the ports from which they are despatched by fast fish trains to London or other busy industrial districts on the coalfields.



[L'HOLO: OPTICAL 5 A., Lia.

A FLEET OF HERRING DRIFTERS LYING OFF SCARBOROUGH.

Cod, haddock, whiting and other "round" fish are usually caught on long lines with hundreds of baited hooks, and the best cod vessels have a middle compartment or "well" through which the sea can flow and in which the cod are kept alive till they reach port.

But *Yarmouth* is the great port of the herring fishery, and herrings are caught neither by the trawl nor by lines. Towards the end of the summer shoals of herrings numbering millions swimming close to the surface approach the East Coast, and to catch them "drift nets" are shot into the water, usually in the evening, from the herring boats or drifters as they are called. A drift net is many fathoms long and few fathoms wide, and by cork floats on its top side and lead sinkers on the bottom is made to hang upright in the water. The shoal runs into this wall of netting and the herrings are caught by the gills in the meshes, which are about an inch square.

The herring season is a short one, but the fish are caught in such amazing numbers that it is necessary to preserve them by salting them down in barrels or drying them to make bloaters and kippers. This work is largely done by Scots women who work slowly down the East Coast; for the herrings come in to the coast of Scotland earlier in the summer than they reach East Anglia. Mackerel and pilchards are also caught in drift nets, but these fish are more abundant off the south-west coasts.

The fisherman has a hard life in his struggles with wind and tide, rain and frost. His hours are often long, night work is common and catches are often very uncertain. But the life makes him strong and fearless, and the wonderful services of the fishermen in the trawlers and drifters which were converted into minesweepers during the Great War give them an additional claim to the gratitude of landmen.

Harwich, which was an old fishing port, has, on account of its good harbour at the estuaries of the Stour and Orwell, become a naval station for smaller types of vessels

and a very important packet station for the Continent. Daily services for mails, passengers and goods are maintained with Hook of Holland, and a train ferry has recently been opened connecting with Zeebrugge in Belgium.

HOLIDAY RESORTS OF EAST ANGLIA

East Anglia cannot boast of fine scenery, but its fields of golden corn with scarlet poppies and blue cornflowers, its peaceful rivers meandering through rich farm lands and its bracing coast, present many attractions for the town-dweller. Nearness to London, with fast train services of the London and North-Eastern Railway and well-known lines of pleasure steamers in the summer months, have caused many villages to become prosperous health resorts. Among these some of the best known are *Hunstanton*, *Cromer* and *Felixstowe*; and the newer parts of the old fishing towns have also developed a tourist industry.

The Norfolk Broads are a famous holiday resort for those who love boating and bathing in peaceful inland waters, and the pursuit of fish and water-fowl. The Broads are a maze of shallow lagoons with reedy banks and islands, which occupy the lower parts of the rivers Bure and Yare and Waveney; they probably originated with the partial silting up of the combined estuary of these rivers.

QUESTIONS AND EXERCISES

1. Why is East Anglia not so famous for its scenery as the West of England?
2. What famous English landscape painter did much of his work in East Anglia? Try to see copies of his pictures or the originals in the National Gallery if possible.
3. What is meant by "cereals" and "root crops" respectively? Name some of each class.
4. Name the Cathedral cities of this region. Why were they relatively more important in olden days than now?
5. Compare the climate of Cornwall and Norfolk. What are the causes of the differences? What effects have these differences on occupations?

6. Why are there more large towns in the Midlands than in East Anglia?

7. Draw a sketch map of East Anglia showing the three main lines of railway (all L.N.E.R.) (1) from London via Chelmsford, Colchester and Ipswich to Yarmouth and Norwich, (2) via Cambridge and Ely to King's Lynn, (3) via Huntingdon, Peterborough and Newark to Doncaster.

8. Draw a sketch map to show the reasons for the growth of Lincoln as (1) a gap town, (2) a bridge town, (3) a meeting-place of old Roman roads—Fosse Way from Exeter, Ermin Street from London, (4) centre of agricultural and sheep-farming districts.

9. Name the counties of East Anglia and the county town of each.

10. How long is the journey from Harwich to Hook of Holland (a) in distance, (b) in time? How far is it from Harwich to Zeebrugge?

CHAPTER XI

NORTHERN ENGLAND

This region is roughly that of the six northern counties of England, and consists of the Pennines and the lands that border them to east and west. It includes three of the most densely-peopled areas in the country, viz. the coalfields of Northumberland and Durham, Lancashire, and the West Riding of Yorkshire. Then there are three of the most beautiful and yet most thinly-peopled areas, viz. the Lake District, the Pennines, and the Yorkshire Moors and Wolds. These make holiday resorts for the people of the former. Finally, there is the Vale of York, a rich farming country of great historical interest. We will deal first with the high lands.

THE PENNINES

These are really a flat-topped plateau rising fairly gently from the plains to the east, but descending more steeply on the western side. Few points are more than 2,000 feet above sea level, the highest, Cross Fell, being less than 3,000 feet. But although it is therefore possible

to walk or cycle across many parts of the Pennines, they are a considerable obstacle to communication, the only really easy route across them being by the natural gap carved by the Aire and the Ribble. The importance of the Aire Gap is shown by the fact that it is traversed by main road, railway and canal. The Tyne Gap further north is also important.

The upper parts of the Pennines are known as the "fells," and they are very bleak and barren. Strong winds, heavy rains, long winters, and a porous limestone soil allow of little vegetation except coarse grass, and the only value of the fells is as sheep walks. The few shepherds lead very hard and lonely lives in their tiny grey cottages built of blocks of the mountain limestone.

The rivers that carry off the heavy rainfall of the Pennines have carved very picturesque "dales," the steep sides of which are often well wooded and the flat bottoms fertile and well cultivated. Where these dales open to the plain, especially on the drier eastern side, are to be seen the ruins of many fine old abbeys and castles, reminding us of their great importance in ancient times.

In the Peak District, at the southern end of the Pennines, underground streams have dissolved out great caverns in the limestone, with stalactites and stalagmites similar to those at Cheddar (*see* p. 55). At *Buxton* and *Matlock* are springs of great medicinal value, and these, added to the fine scenery and bracing air, have made those places famous inland health resorts. *Harrogate* further north is also a famous spa.

THE LAKE DISTRICT

This is a region of much harder rock than the Pennines and therefore of much bolder scenery. But it is one of the wettest districts in the British Isles, Seathwaite having a mean annual rainfall of about 11 feet! Even the

hardest rocks cannot resist the effects of this century after century, and the whole area has been carved up

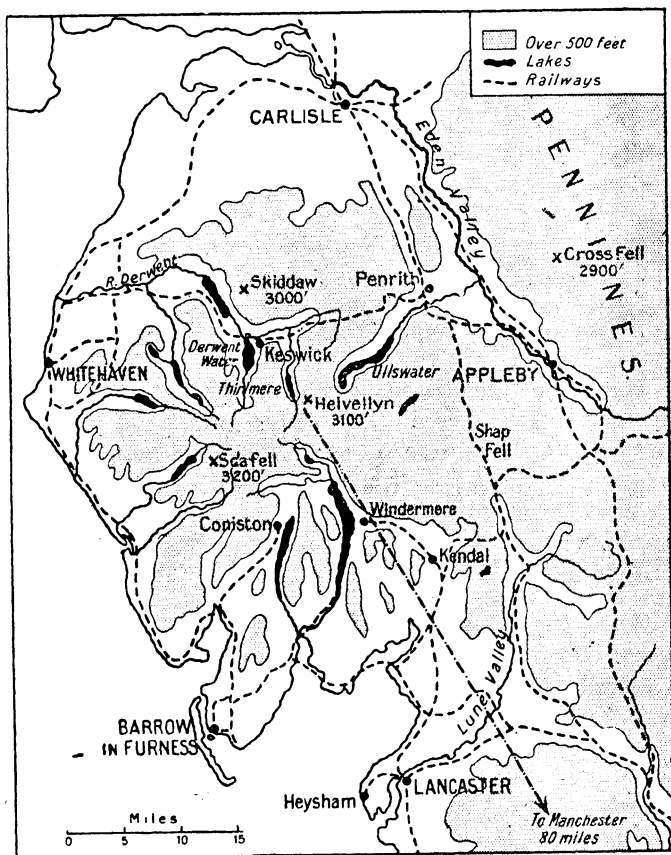
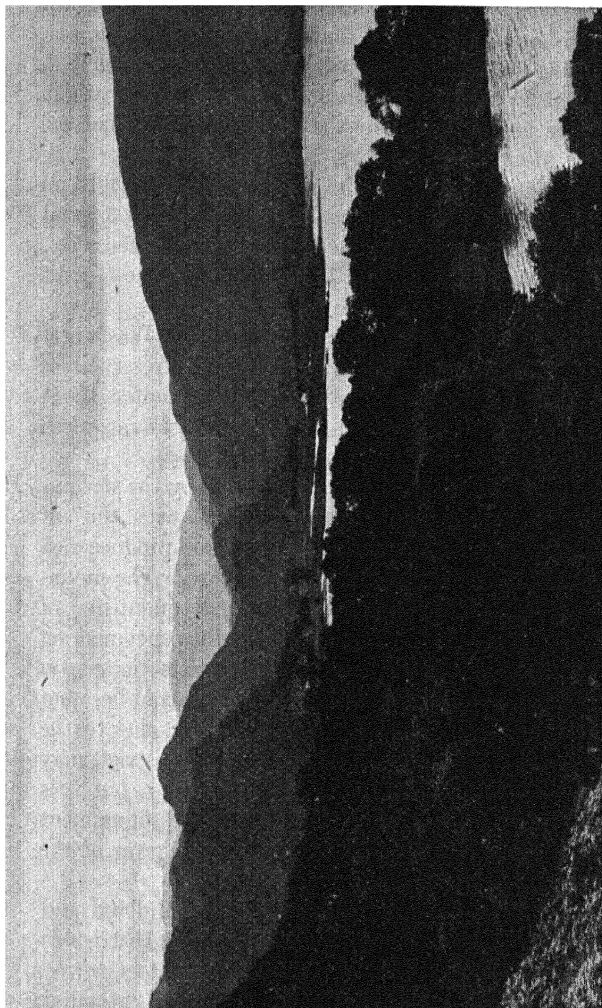


FIG. 20.—The English Lake District. Note valleys once occupied by glaciers now by rivers and lakes.

by rivers whose valleys radiate in all directions from the central peaks of Sea Fell and Helvellyn.

In prehistoric times these valleys, too, were probably



[Photo: L.M.S.R.]

THE HEAD OF DERWENT-WATER, WHERE THE RIVER DERWENT ENTERS THE LAKE FROM BORROWDALE.
Note the wooded lower slopes of the mountains and the flat meadow-land built up from silt brought into the lake by the river.

filled with glaciers, which deepened them and smoothed their sides as they moved slowly down towards the sea. When the climate became warmer and the glaciers melted, they left in the valleys masses of rock rubbish which had been brought down by the ice, thus forming natural dams. Most of the valleys, therefore, have now long narrow lakes from which the mountains rise steeply on either side; and these lakes and mountains are a great attraction to dwellers on the drier plains. Scafell Pike, although only 3,200 feet in height, is the highest point in England, and offers quite a risky climb.

Windermere is the largest of the lakes and Wastwater the deepest. The little lake Thirlmere is a reservoir of drinking water for the great city of Manchester about 80 miles away. (See Fig. 20.) The same city has acquired Hawes Water for a similar purpose.

The lakes are being very slowly filled up by the streams which enter them building up "deltas" with the silt they bring down. These mud flats in time produce rich grassy meadows suitable for cattle-pasture. The mountainsides are sheep pastures, and small quantities of black-lead, mined in the district, started the pencil making at Keswick. But if it were not for tourists the region would support very few people indeed. As coal becomes dearer the valuable supplies of water-power, due to the heavy rainfall and steep slopes of the Lake District, may be used more and more to generate electricity, but it is to be hoped that this will not lead to the disfigurement of the glorious scenery which is the great charm of the Lake District.

The two great main lines of the London, Midland and Scottish Railway pass very close to the Lake District as they traverse the fertile Eden Valley *en route* to *Carlisle*, the great border city with its fine old castle and cathedral dating from Norman times. Branch lines lead to *Kendal* and *Keswick* and smaller tourist centres near the lakes.

To the west of the Lake District lie two busy industrial

regions on the coast. The Furness District of North Lancashire produces fine iron ore. This is smelted with coal brought from *Whitehaven* in Cumberland and the steel is used at *Barrow* in the making of ships, machinery and armaments. The coal of Cumberland, much of which is mined under the sea although the shafts are on the mainland, is chiefly used in iron smelting at *Workington* or exported to the shipyards of Belfast in Northern Ireland.

THE YORKSHIRE MOORS AND WOLDS

The Moors are a plateau about 1,000 feet in height composed of limestone similar to that of the Cotswolds and Portland. Their surface is undulating and covered with crisp turf and heather which looks glorious in early summer. The Moors present a steep face to the North Sea, and where streams have cut steep wooded valleys in the face of the cliffs little fishing villages have sprung up. These are gradually becoming popular summer holiday resorts. *Whitby*, with its quaint little harbour at the mouth of the Esk and the fine abbey ruins crowning the cliffs above, is well known.

The Wolds are rounded chalk hills similar to the Downs in the South of England, and like them end in steep white cliffs on the coast. Flamborough Head is famous as a landmark for ships. Like the Downs the Wolds are sheep pastures.

Between the Moors and the Wolds on a stretch of beautiful sands lies *Scarborough*, the finest seaside resort in the North of England.

THE VALE OF YORK

This is one of the richest farming lands of England, almost rivalling East Anglia in fertility. It is drained by the Yorkshire Ouse and its tributaries, these coming from the Pennine Dales on the right bank, and the Derwent from the fertile vale of Pickering on the left. Like all similar districts it is dotted with villages and

market towns, and the growth of the great population on the coalfield to the west has greatly increased its importance as a producer of foodstuffs and also of raw materials for the woollen and leather industries.

York has always been the great centre of the region, and it is still the chief ecclesiastical and military centre of Northern England. As the tidal limit of the navigable Ouse and an easy bridge-place, as the converging point of several of the Pennine Dales and roads, as the midpoint on the Great North Road between London and the ancient Scottish capital, it grew to importance in early times. In modern times these roads have been supplemented by railways which have added to its trade and importance. Its old walls, dating from Norman times, and its fine old Early English Minster are the glories of the city, and it has no reason to envy the much larger but much less beautiful cities that have sprung up during the last century on the neighbouring coalfield.

THE WEST RIDING COALFIELD

The western third (or thridding) of the county of Yorkshire contains the chief part of one of the richest coalfields in the country. The coal "measures" or layers of rock in which the coal seams are found are very close to the surface in the dales of the Aire, Calder and Don on the eastern slopes of the Pennines, but farther out on the plain deep mines have to be bored through the overlying rocks (*see* Fig. 21). Much of the coal is used for domestic fuel and is sent for this purpose by rail and sea to London and other places. But most of it is used in the great iron and steel industries of Sheffield or in the textile industries which are concerned with the spinning and weaving of various fibres to make them into cloth.

Woollen Industry.—The West Riding of Yorkshire specializes in wool. In olden days the shepherds of the fells and moors sheared their sheep in early summer and washed the greasy fleeces in the running streams. The

wool was then packed in bundles or "bales" and sent by pack-horse down to the market towns in the dales or vales. The bales of wool were there bought by merchants from Flanders and transported across the North Sea to be made into woollen cloth, some of which found its way back to England again.

In the Middle Ages natives of Flanders suffering from religious persecution were offered a refuge in East Anglia and taught the English how to spin the wool into threads or "yarn" and to weave the yarn into cloth. This knowledge spread to the wool-producing areas of Yorkshire which were favoured with their abundance of sheep, clean water for washing the wool, and swift-running

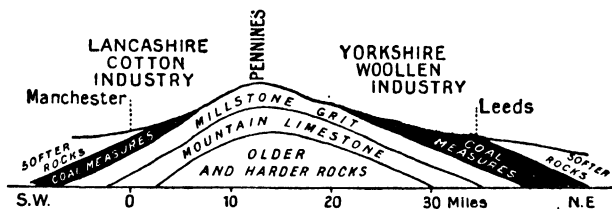


FIG. 21.—Rough Section across the Lancashire and Yorkshire Coalfields.

streams which inventive men learned to use to do the work by machinery more quickly than it could be done by hand.

In the nineteenth century came the discovery of the steam engine and its application to spinning and weaving machinery. The abundance of coal in the West Riding then enabled the industry to increase at such a rate that that region has become not only the greatest for the manufacture of woollen goods in Britain but the greatest in the world. The many processes involved in "sorting," "washing," "carding," "combing," "spinning," "weaving," "finishing," and "dyeing" the wool before it becomes the finished roll of dress material employ thousands of men and women, while coal mining and the

making of machinery for the mills occupy thousands of others. The once picturesque dales of the coalfield have thus become disfigured with smoky factories and closely built towns.

Leeds (see Fig. 22) is the great centre of the wool trade, situated where the great north and south route at the foot of the Pennines crosses the important east and west route of the Aire Gap. Besides woollen mills it has great manufactures of textile and other machinery and an important leather trade. It has also a University where, amongst other things, all the scientific knowledge of use in these various industries may be gained by those who will be responsible for carrying them on and developing them still further.

Bradford specializes in "worsted," as the finer cloths used for dress materials and suitings and made from the longer stapled wools are called. Mohair, the long silky hair of the Angora goat, is largely used in the making of these materials. *Huddersfield* also makes worsteds. *Wakefield* and *Barnsley* make heavier "woollen" cloths from wool of shorter fibre, and *Halifax* has important carpet-making industries. *Batley* and *Dewsbury* make up wool combings and even old torn-up clothing into cheap woollen cloth called "shoddy"; and these towns, as well as *Leeds*, turn out vast quantities of "ready-made" clothes. *Dewsbury* is also the centre of the dyeing industry.

Steel and Cutlery.—*Sheffield* has been famous for these industries for centuries. Iron ore was found locally and used to be smelted with charcoal made from trees felled in Sherwood Forest on the borders of Notts and Derby. In the Pennines to the west of Sheffield there are found, overlying the mountain limestone, layers of a gritty sandstone known as Millstone Grit (see Fig. 21) from some of which good grindstones could be made. This helped to give Sheffield its reputation for knives and edged tools and weapons of all kinds. When the use of coal in smelting iron and the manufacture of steel was discovered

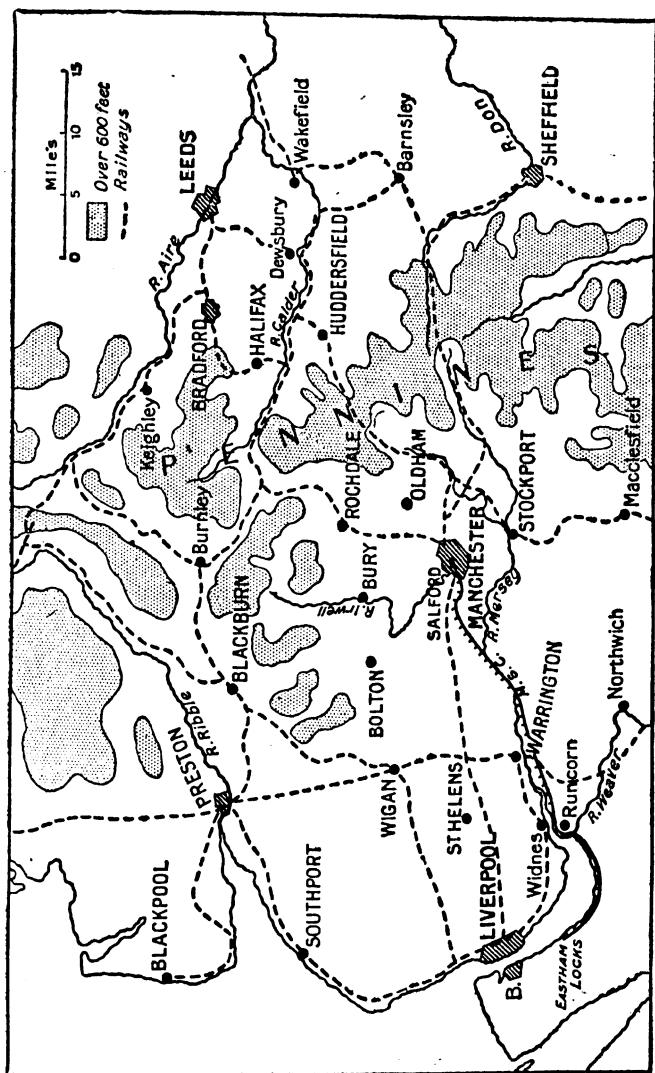


Fig. 22.—Centres of Cotton and Woollen Industries.

Sheffield was more favourably situated than some of the old smelting centres such as the Weald whose supplies of charcoal were getting used up with nothing to replace them. And now, although the local iron ore is largely worked out, good supplies can be obtained from Sweden and Spain, and the abundance of local coal makes it worth while to import them in order to keep up the great steel industries for which Sheffield is world famous.

Rotherham and *Doncaster*, two other places in the West Riding and also on the river Don, have important iron industries, the former being a well-known smelting centre and the latter famous for the railway works of the London and North-Eastern Railway.

Hull, situated where the little river Hull enters the broad Humber estuary and with docks and wharves along both rivers, is the great port of the West Riding. Here ships may be seen unloading bales of wool from Australia, New Zealand and South Africa, iron ore and pig iron from Sweden and Spain, pit props from Norway and Sweden, all to be used in the industries of the coalfield. Then, on account of the large population of the coalfield, Hull imports vast quantities of grain from India, South America and South-eastern Europe, dairy produce from Holland, Denmark and Sweden, and fruit from the Mediterranean countries. In exchange for these things Hull exports shiploads of coal, iron and steel goods, cloth and clothing, mainly to the countries across the North Sea. Hull also sends fishing fleets to the Dogger Bank.

THE SOUTH LANCASHIRE COALFIELD

The Cotton Industry.—This, the greatest manufacturing industry in the country, judged by the number of people employed in it and the value of its products, is centred on this coalfield. As no cotton grows in Britain all the raw material must be imported, and the money value of this commodity is greater than that of any other single article imported into the country, greater even than that

of corn and flour. Cotton goods are also by far the greatest export of Britain.

Cotton is the white fluff which bursts out from the ripened seed pod of the cotton plant which flourishes in many warm countries. The greatest quantities are grown in the southern states of the United States of America, in Egypt along the Nile and in India, but it has been introduced into Nigeria, the Egyptian Sudan, Uganda and several other parts of the British Empire where the climate is suitable.

The cotton pods or "bolls" are picked by natives and taken to the "ginneries" where the fibre is stripped by the machine "gins" from the seeds and pods. Long staple cotton fibres, which are used in the finest fabrics, are about 2 inches long, while short staple cotton used for coarser materials is often less than 1 inch in length. The cotton is therefore sorted and then compressed into bales weighing about 500 lb. for export. Shiploads of these cotton bales, chiefly from the United States and Egypt, come to Liverpool or to Manchester by way of the Ship Canal (*see* Fig. 22), every week. They are unloaded and distributed to the spinning mills where a large number of operations ("opening," "scutching" "carding," "combing," etc.) are performed by separate machines to produce a long, clean, soft, fleecy, untwisted rope of cotton fibre called a "sliver." Further machines reduce the thickness of the sliver, and eventually the "spinning frame" or "mule" puts a twist into the fibres by means of "spindles" and produces fine strong cotton "yarn" ready to be woven into cloth.

The various spinning processes are carried on most satisfactorily in a damp atmosphere which prevents the fibres from becoming brittle and breaking. The moist atmosphere of Lancashire, due to the moisture-laden westerly winds rising and cooling as they approach the Pennines, has therefore given it a great advantage over other English coalfields for this particular industry. For

this reason also a few towns on the coalfield whose situation favours them in this way specialize in spinning. *Oldham* is the chief spinning centre, while *Bolton* is also famous.

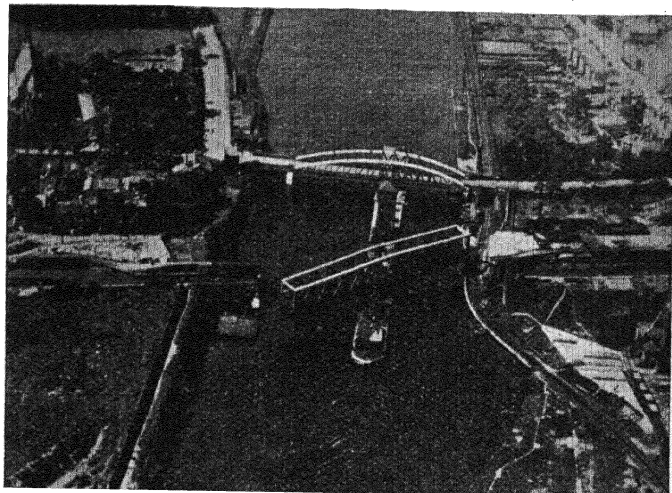
The spun yarn is taken from the spinning mills to other mills, usually called weaving sheds, often in other towns, to be woven into cloth on "looms." The "warp" threads, or those which will run from end to end of the long finished piece of cloth, are strongest, and are first wound side by side on a roller called the warper's "beam." The beam is fitted on the loom and the warp threads passed through the "healds" which will raise some and lower others as desired in order to allow the cross threads or "weft" to pass between them. The weft thread is carried on a bobbin in a "shuttle" which, when the loom is in motion, flies backwards and forwards between the warp threads several hundred times a minute. A "reed" or comb closes up the weft into its proper position and the cloth is wound off on rollers at the other end of the loom. The largest number of looms is found in the district between *Burnley* and *Preston* on the northern edge of the coalfield.

Bleaching and dyeing are other important processes in the textile industry. The chemicals used in them are largely produced from salt and coal, and abundance of water is also important. The Weaver Valley in Cheshire, just to the south of the Mersey (see Fig. 22), is the greatest salt-producing area in the country, and this is very conveniently situated for Lancashire. There are large chemical and dye factories at *St. Helens* and *Widnes* in Lancashire and at *Birkenhead* and *Runcorn* in Cheshire, while works where the actual bleaching and dyeing are carried out are found in many of the spinning and weaving towns. There is now a large industry in artificial silk, made by treating wood pulp with chemicals, at *Macclesfield* and *Leek* at the southern end of the coalfield.

Many of the towns already mentioned, especially *Oldham* and *Salford*, have also works for the making of

textile machinery of all kinds to supply the mills not only of Lancashire but of other parts of the country and the world, for the inventiveness and experience of Lancashire men in this class of work is unrivalled.

Manchester, sometimes called Cottonopolis or the "cotton city," is the great centre of the industry, where on "market days" importers of raw cotton, master



[Photo: Manchester Ship Canal Co.
MANCHESTER SHIP CANAL.]

Notice the famous Barton Swing Aqueduct built to carry the earlier Bridgewater barge canal. It and the parallel road bridge are swung to allow ships to pass.

spinners and weavers, bleachers and dyers, buyers for British shops and foreign markets can meet each other and carry out in a short time all the many business transactions on which this enormous industry depends.

As its name implies, it was an old Roman settlement, but for centuries it was just a small market town in a not very prosperous agricultural district. But with the opening up of the coalfield, the development of the cotton

industry and increase in the population of the surrounding towns it grew with them in importance. The construction of the Bridgewater Canal in 1776, followed later by railways and, in 1894, by the Manchester Ship Canal (*see* Fig. 22) which converted the city into a seaport for quite large vessels, have enabled the twin town of Manchester and Salford to increase its population from 30,000 to almost a million in the last 150 years.

The Ship Canal has made Manchester an important market for timber and wood pulp from Canada, Newfoundland and the United States, oil from Mexico and the United States, grain from Canada, and fruit, especially bananas, from the West Indies. As a cotton port it is still second only to Liverpool.

Liverpool is not only the great seaport of this region but is second only to London in volume of its trade. A glance at the map will show how centrally it is situated with regard to all the countries of the British Isles, and how accessible it is not only to the Lancashire coalfield but also to the busy industrial Midlands. The Leeds and Liverpool Canal through the Aire Gap and several railways through the southern Pennines give it communication with the busy West Riding coalfield whose products it helps to export. The Mersey estuary is a fine capacious harbour, and the swirl of the tides through the narrow bottle-neck entrance helps to scour a deep water passage so that the largest vessels afloat are able to enter the port. The further dredging of the channel and construction of miles of docks and wharves along the river front with all the modern equipment for rapidly loading and unloading vessels have added to its importance. Many large passenger liners, such as those of the Cunard-White Star and Canadian Pacific Lines, have regular sailings to and from Liverpool, and thousands of cargo boats bring cotton and wool, grain and meat and timber, chiefly from North and South America, and take away cotton and woollen goods, machinery and chemicals to all parts of the world. Large

numbers of ships are built and repaired at Birkenhead on the Cheshire side of the Mersey with which Liverpool is connected by steam ferry and also by a railway and a road under the river. Liverpool is also a big importer of cattle and dairy produce from Ireland for the great population of the region behind it. The cattle are often kept for some weeks on the rich pastures of the Lancashire and Cheshire plains to fatten them for market.

Both Manchester and Liverpool have important modern Universities, and the latter city has in course of construc-

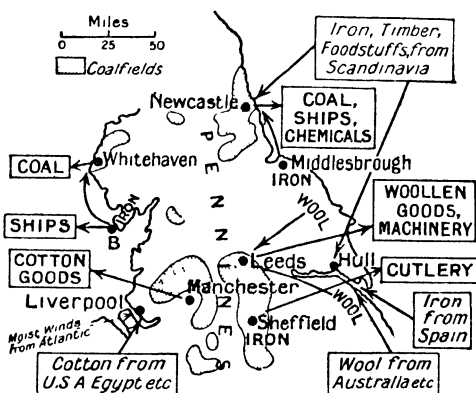


FIG. 23.—Coalfields, Industrial Centres and Seaports of Northern England.

tion the largest cathedral in Britain, and one of the finest buildings of modern times.

THE NORTHUMBERLAND AND DURHAM COALFIELD

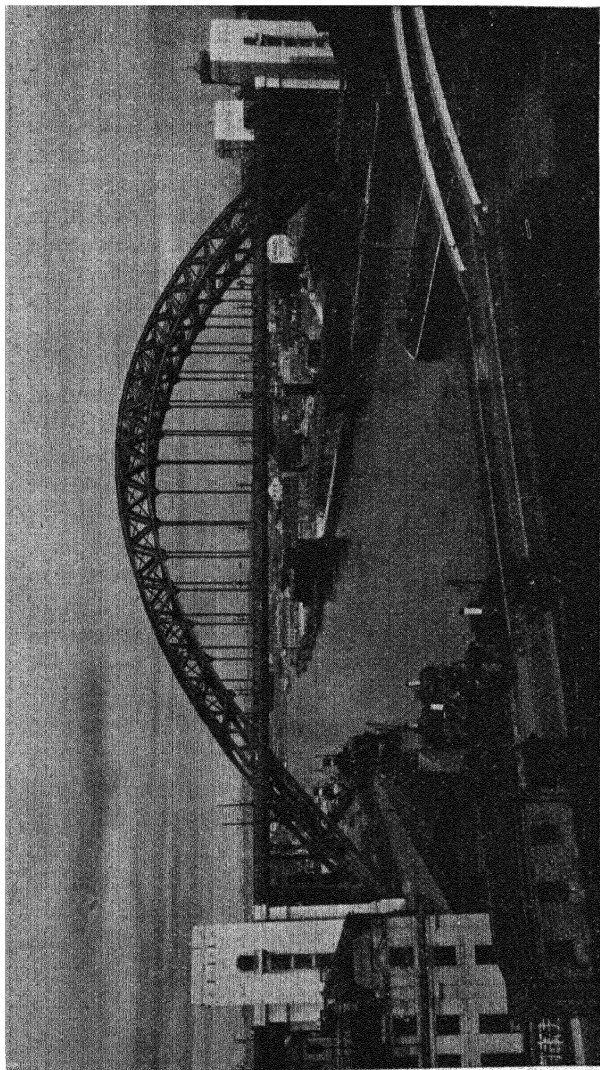
This has the special advantage of lying close to the sea so that one of its great industries is the mining and export of coal: the name of *Newcastle*, the chief port of the coalfield, is associated with coal all over the world. Close to the coalfield, in the Cleveland Hills of North Yorkshire, are the richest supplies of iron ore in Britain, and *Middlesbrough*, at the mouth of the Tees, is one of the best known

iron-working centres in the whole world (*see* Fig. 23). Its enormous output of steel rails and heavy ironwork such as that used in bridge building demands more iron ore than the local mines can supply, but this can easily be made up by importing from Sweden and Spain.

Plenty of coal and iron and the three wide navigable estuaries of the Tyne, Wear and Tees have led to this region becoming famous for the building of steel ships of all kinds from gigantic liners and battleships to small trawlers and pleasure steamers. The casting of the steel keel and ribs and plates and the riveting of these together employ thousands of men, while the making and fitting of the engines employ still more in the shipyards at Newcastle, Sunderland, Hartlepool and many other towns along the estuaries. Usually only the empty hull of a ship is built on the slipways before launching ; after which it is towed into a dock where it is fitted with its machinery and woodwork previous to undergoing its sea trials before delivery to its purchasers as a finished vessel.

In the south of County Durham, near the Tees estuary, large supplies of salt are to be found. From this soda and other chemicals are made, and as soda is one of the chief constituents of glass, there are in this region a number of chemical and glass works, a good supply of coal being required in both industries.

Newcastle, the county town of Northumberland, is the largest town of the area. Its "new" castle is a Norman one which shows that it was an important settlement in much earlier times. It grew up where the great North Road to Scotland crossed the Tyne at its lowest bridge-point and met the important road that came through the Tyne Gap from Carlisle. Although in olden days the Tyne was much shallower than it is to-day ships could reach Newcastle at high tide. It had therefore been for centuries an important market town in a fertile lowland. But its growth into a great town dates from the extensive use of coal for smelting iron and driving machinery, the



[Photo: *Will F. Taylor.*]

NEW TYNE BRIDGE AT NEWCASTLE.

Note the older swing bridge in the foreground. The ships are on the Newcastle bank of the river. What town is on the other side? In what county is it? Was the camera facing up or down stream?

enterprise of the people in deepening the Tyne estuary, and the construction of railways following the old roads.

As the largest shipyards are just "above" Newcastle, the railway crosses the river by a high-level bridge and the roads by a swing bridge and a high-level bridge, thus enabling big ships to pass easily up or down the river. The University College at Newcastle is famous for its science and engineering schools which train those who are responsible for carrying on mining, ship-building and chemical industries in many parts of the world. Newcastle carries on a great trade with the North Sea and Baltic countries, sending out coal and machinery and chemicals and importing timber, iron and dairy produce from Norway, Sweden and Denmark.

Durham, with its noble Norman Cathedral and Castle crowning a wooded hill rising steeply from the river Wear, is one of the most picturesquely situated cities of Britain. The river almost encircles it in a great loop, giving it an admirable defensive position. This was so important in ancient days that the Prince-Bishop of Durham was entrusted with the power to raise men to resist inroads into Southern Britain by the Scots from beyond the border. But this defensive position has made it rather inaccessible in modern days, so that while industrial towns and mining villages have sprung up on the coalfield all round it, Durham remains rather aloof from this sort of progress and preserves much of its mediæval charm.

It should not be overlooked that outside the mining districts large parts of Northumberland and Durham are good mixed farming areas. Although soil and climate are not excellent for wheat, good crops of barley, oats and roots can be grown; the lowlands provide pasture for the famous Durham Shorthorn cattle, and the Pennines and Cheviots are well known for their sheep.

QUESTIONS AND EXERCISES

1. Draw a sketch map of Northern England showing the Pennines, the Tyne Gap, the Aire Gap, the Lake District, the Peak, the

Yorkshire Ouse and its tributaries, the Vale of York, the North York Moors, the Yorkshire Wolds, Buxton, Matlock, Harrogate, Keswick, Scarborough.

2. Try to obtain specimens of chalk, oolitic limestone, mountain limestone, iron ore, millstone grit, and compare them.

3. Contrast the Lake District with East Anglia in its scenery and occupation.

4. Name ranges of hills and headlands that are made of chalk : note their positions on the map.

5. Draw a sketch map of Northern England showing the coal-fields and chief centres and industries of each.

6. Draw sketch maps illustrating the reasons for the growth and importance of Liverpool, Manchester, Leeds, Hull, Sheffield and Newcastle.

7. Describe any well-known railway route from London (*a*) to Carlisle, (*b*) to Berwick. Find out the length of the journey in miles and in hours.

8. What foreign countries would you expect to be the best customers (*a*) for Lancashire cotton goods, (*b*) for Yorkshire woollen goods ? Why are far more cotton goods than woollen goods produced in England ?

9. Name the different classes of workers through whose hands pass the material for the making of (*a*) a cotton handkerchief, (*b*) a woollen blazer before it reaches a shop for sale.

10. In what respects does the iron industry of the Black Country differ from that of the Furness and Cleveland districts ? Why ?

11. Name the counties of Northern England and the county town of each.

12. How does the climate of Lancashire differ from that of Yorkshire ? What effect has this difference had upon (*a*) the farming, (*b*) the manufacturing industries of each ?

13. Name the chief holiday resorts of Northern England and the districts which each specially serves.

14. Trace on the map the routes of (*a*) a cotton ship from New Orleans to Manchester, (*b*) a wool ship from Sydney, Australia, to Hull, (*c*) a grain ship from Montreal to Liverpool, (*d*) a ship loaded with iron ore from Lulea in Northern Sweden to Newcastle.

15. Of what use are the Pennines to the cotton industry, the woollen industry and the steel industry respectively ?

CHAPTER XII

WALES AND THE WELSH MARCHES

THE WELSH MOUNTAINS

Notice how little of Wales is less than 500 feet above sea-level : indeed about half the country exceeds 1,000 feet

in height. It is really a plateau of old hard rocks which rain and running water and ancient glaciers have carved into a series of ridges and valleys, most of which run in a north-east-south-west direction and make communication from north to south of the land very difficult indeed. But the mountains are one of the glories of Wales and, like the Lake District, which North Wales especially much resembles, they form a great attraction in holiday times to dwellers in the English plain.

Lying in the track of the very prevalent south-westerly winds, which come uninterrupted from 3,000 miles of ocean, these mountains receive a very heavy rainfall, in places exceeding 100 inches a year. This clothes the mountains with verdure and provides the water for the placid lakes and tumbling waterfalls that add their charms to the rugged mountain scenery. Big cities of the plains like Liverpool and Birmingham have also found in these rainy mountains a never-failing supply of drinking water for their teeming masses : the former in the Vyrnwy and the latter in the Elan Valley (*see* Fig. 24). In the Conway Valley, too, the falling water is used to develop electricity on a large scale for the extraction of aluminium from its ores, and for electric light and power in neighbouring towns and villages.

The mountains also provide slate and hard stone for building purposes, and road metal which is in great demand in the neighbouring clay plains of England. The slate quarries between Snowdon and the Menai Strait are the most famous in the world. Slate is really clay which has been hardened by natural heat and pressure in the earth's interior long ages ago. Its great value lies in the facts that it can resist the wear and tear of wind and rain better than most stone, and also that it can be easily split into quite thin sheets, thus making the best possible natural material for roofing buildings. The slate is blasted out of huge galleries in the mountain-side by dynamite ; and trucks laden with the roughly-

prepared blocks are attached to an endless cable which enables empty trucks to be drawn up by the descent of the loaded ones to the works or docks.

The more sheltered mountainsides and valleys are used

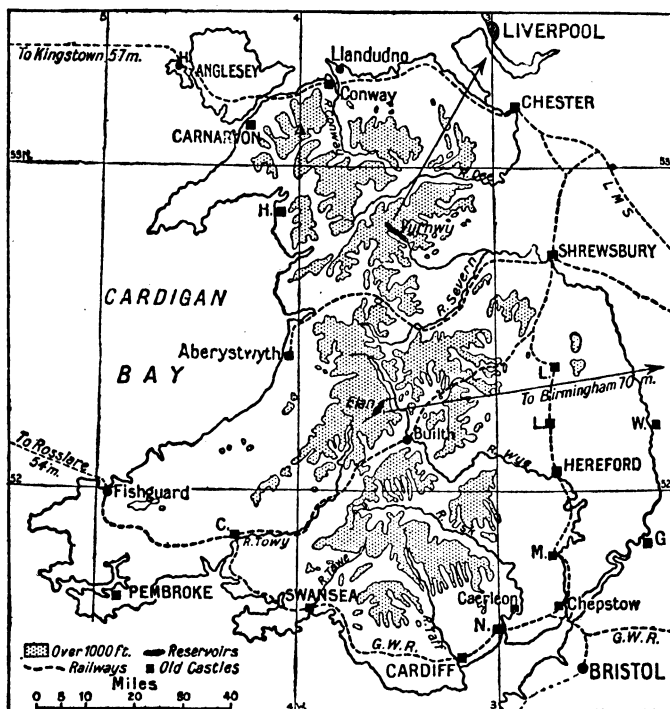


FIG. 24.—River Valley and Coast Routes from England into Wales, with the old Castles guarding them and the modern Railways following them.

as sheep pastures, and the small Welsh sheep are famous for their mutton. The villagers make coarse homespun woollen cloth, and at *Newtown* and *Welshpool* in the upper Severn valley the local wool is made into flannel, but the industry is steadily declining.

Among the mountains may still be found people whose only language is Welsh, and practically all speak Welsh besides English. This reminds us that the ancient Celtic inhabitants, driven from the richer plains and valleys by better-armed invaders, managed to maintain their independence and their language in their secure if unenviable mountain homes. Notice place-names containing the Celtic syllables *Aber* (a river mouth), *Bedd* (a grave), *Cacr* or *Car* (a fortress), *Coed* (a wood), *Lynn* (a lake), *Llan* (a church), *Nant* (a brook), *Wy* (water).

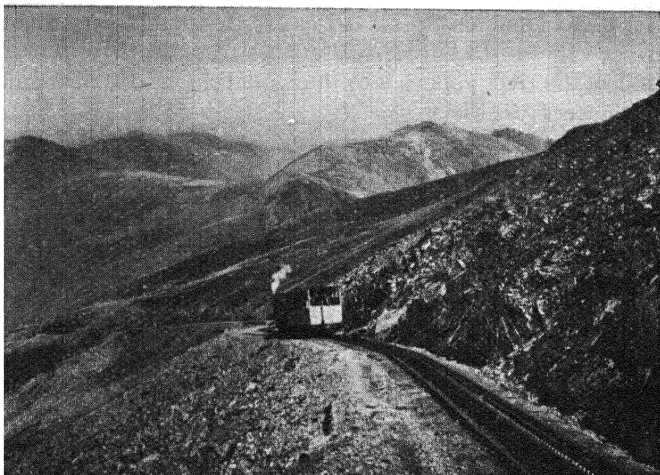
There are many well-known health resorts among the mountains of Wales, and some like *Builth* and *Llandrindod* have health-giving mineral springs as well as fine scenery. The large holiday resorts are those like *Llandudno* in the north and *Aberystwyth* on Cardigan Bay, which can offer the attractions of a sea-coast combined with fine mountain scenery close at hand.

ROUTES ANCIENT AND MODERN

Although the mountains are interesting and, as we have seen, are not without value, the coastal plains and river valleys have always been more valuable as the homes of people. They provide fields for growing food crops and pasturing cattle, and in them communication is much more easy. In ancient times the stronger people possessed themselves of these plains and valleys, driving the weaker to the higher parts. From time to time the latter would descend to raid the fertile lowlands, especially the English Marches or borderlands. To check these the Romans built roads along the north and south coast, with garrisons at Chester on the Dee in the north and Caerleon on the Usk in the south.

The Saxons later built a line of earthworks from Chester to Chepstow, and the Normans built castles at Chester, Shrewsbury on the Severn and Hereford on the Wye. The Lords of the Marches from these strongholds pushed their conquests up the valleys and along the

coasts, and when finally Edward I built his castles at Conway and Carnarvon the Welsh were cut off from their food supplies from Anglesey and surrendered. Since then the two peoples have learned to live together in peace, and the only invasions nowadays are peaceful ones—Englishmen invading the holiday resorts of Wales in the summer time and Welshmen coming into the more pros-



[Photo: L.M.S.R.]

SNOWDON MOUNTAIN RAILWAY.

How does it differ from an ordinary railway? Why?

perous English lowlands to take their part in the political, professional, industrial and commercial life of the country.

It is interesting to notice how the modern railways follow the old roads, in both cases the coastal plains and river valleys providing the easiest routes (*see* Fig. 24). The Irish rail route of the Great Western Railway comes under the Severn Tunnel and follows the south coast route through Newport, Cardiff and Swansea to Fishguard, whence the packet boat runs to Rosslare in Ireland. The London, Midland and Scottish route to Ireland goes by

Chester along the narrow coastal plain—in places so narrow that the railway is on the seashore—through Conway and across the tubular iron bridge over the Menai Strait to Holyhead. From here packet boats run to Kingstown, now called by the Irish, Dun Laoghaire, on Dublin Bay.

A third important route runs through the Welsh borderland from Chester via Shrewsbury, Ludlow, Hereford and Monmouth—all old castle towns guarding their river valleys—to Cardiff. Branches from all these routes follow the river valleys into the mountainous districts and give access to the west coast.

Three of the great English route centres on the Welsh border may be specially noted.

Chester has still its old city walls, castle and cathedral to tell of its ancient importance. It also has an enormous cattle market where cattle from the rich pastures of Cheshire—a county famous for cheese—and also from Ireland are bought and sold in large numbers every week. The silting up of the Dee and the growth of Liverpool have robbed it of its former importance as a seaport, but the small coalfields of Flint and Denbighshire and the junction of roads and railways from North Wales, South Wales, Lancashire and London make it a thriving city.

Shrewsbury, on a hill in an easily defended loop of the Severn, became important in early times as a market town for the fertile farming area around it. Old roads and modern railway routes already mentioned have added to its importance, and a few miles farther down the Severn is the Shropshire coalfield on the borders of the Black Country. Owing to its accessibility from all parts of Wales and the difficulty of communication of one part of Wales with another, this English county town almost serves the purpose of a capital for Wales.

Hereford on the Wye, one of the most picturesque rivers of Britain, is a cathedral city and county town in a region of rich red soil famous for its great red cattle,

its cider apples and its hops. Routes converge upon it from Shrewsbury to the north, Cardiff and Newport to the south, Worcester and Gloucester to the east, and Swansea via the Tawe and Wye valleys to the west.

THE SOUTH WALES COALFIELD

This coalfield, which occupies almost all of the county of Glamorgan and only small portions of the adjoining counties, supports more than half the population of

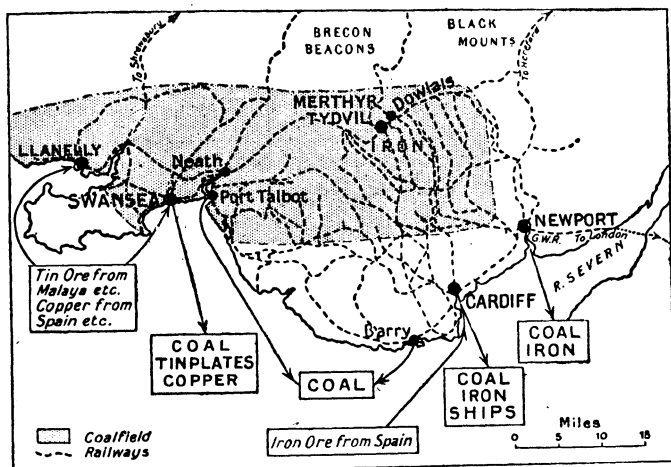


FIG. 25.—The Railway Network and Industries of the South Wales Coalfield. (Compare with Physical Map, Fig. 24).

Wales and has an annual output of coal second only to that of the Yorkshire, Notts and Derby coalfield. A number of short rivers run southwards from the Brecon Beacons and help the coal-mining industry in two ways. In the first place they have cut so deeply into the coal measures which lie fairly near the surface that the coal can in places be obtained by just tunnelling into the valley sides without the necessity of sinking deep shafts. Then also the valleys have enabled the easy construction of railways to carry the coal to the coast for export

(Fig. 25). Hundreds of trainloads run daily to the docks at *Newport*, *Cardiff*, *Barry*, *Port Talbot* and *Swansea*, where modern machinery empties whole truckloads at a time into the holds of vessels waiting to carry it to all parts of the world.

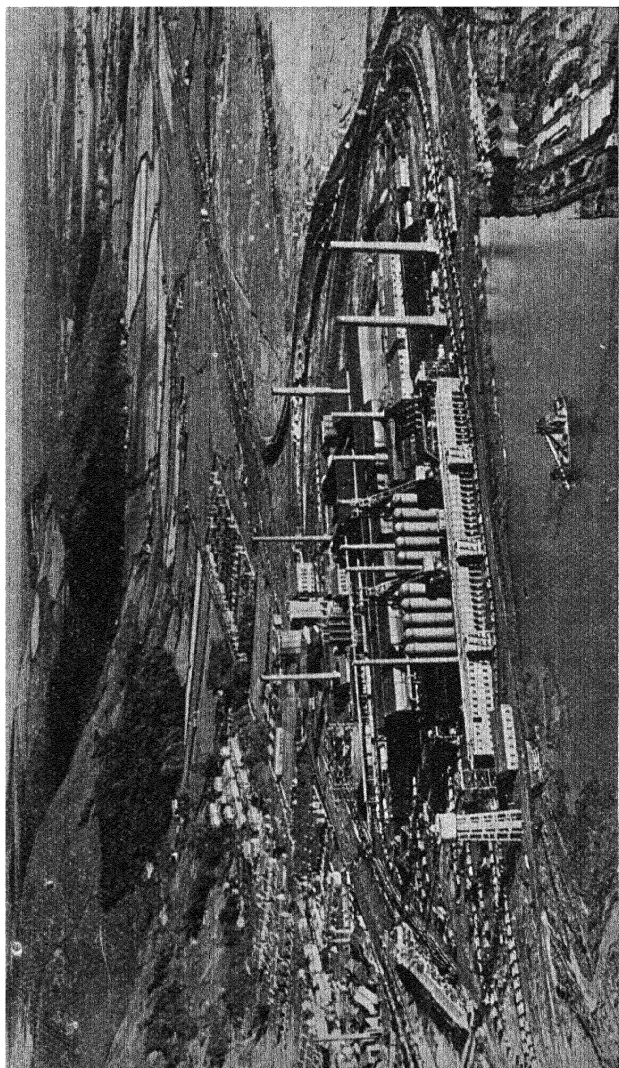
Some parts of this coalfield produce anthracite, the highest grade of coal, which burns with intense heat and no smoke and is therefore much in demand, especially for those warships which still burn coal rather than oil fuel.

In the north of the coalfield valuable supplies of iron ore are worked, and the blast furnaces around *Dowlais* and *Merthyr Tydvil* remind one of the Black Country. Large quantities of iron ore are also brought from the north coast of Spain in vessels which take back coal for use in the smelting industry there. Much of this ore is now smelted near where it is landed at *Cardiff* and *Swansea*.

Copper and tin ore, brought across the Bristol Channel from Cornwall to be smelted with Welsh coal at *Swansea* and *Llanelly*, led to further smelting industries which now use vast quantities of tin from the Malay States; Bolivia and Nigeria, copper from Spain, Chile and North America, and nickel from Canada. The fumes from these industries kill the vegetation for miles around and, together with the rubbish heaps from the mines and the ill-built and crowded mining villages, make this region the most unhealthy and least picturesque part of the whole country.

Much of the tin is used in the tinplate works of *Swansea* and district. In these iron is rolled out into sheets of different thicknesses and coated with a thin layer of tin to prevent it from rusting when exposed to moist air. Most of the "tins" used for packing foodstuffs and other articles are really made of this tinplate, which is much stronger and very much cheaper than pure tin would be. The corrugated iron so much used for roofing is made in a similar way, but is coated with zinc instead of tin.

Cardiff is the greatest town of the coalfield and of Wales. It grew as an old fortified market town at the



By kind permission of Messrs. Baldwins, Ltd.]

STEEL WORKS, PORT TALBOT.
(See Figs. 24 and 25, and Question 7, p. 112.)

[Central Aerophoto Co., Ltd.]

lowest bridge-point of the Taff, and at the junction of that river valley with the coastal road through the fertile plain of Gwent. It had also a good harbour, and when the rich coal and iron mines in the Taff valley were opened up it soon became the greatest town in the area. Development of its docks has enabled it to become the chief port of Britain for the export of coal, and a great smelting centre for imported iron ore. A network of small railways from the valleys of the coalfield converges upon it, and the important mail route from London to Fishguard passes through Cardiff. With a population of over a million in the region behind it, it has become a large importer of foodstuffs.

QUESTIONS AND EXERCISES

1. Draw a sketch map of Wales. Mark the contour line of 500 feet and shade all land above that height. Mark Snowdon, the highest peak, and Plinlimmon at the source of the Severn. Mark the Brecon Beacons and the rivers Dee, Severn, Wye, Taff, and Conway. Mark distinctively the holiday resorts and old castle towns mentioned in the chapter.

2. Draw a sketch map of the South Wales coalfield. Mark the river valleys, coal ports and smelting centres mentioned.

3. Why has Wales no capital city? What are the claims of Cardiff to this position?

4. Contrast the physical features, climate and industries of East Anglia and Wales.

5. Describe the route from London to either Fishguard or Holyhead.

6. To what extent has the decline of Chester and the rise of Liverpool as seaports been influenced by the shape of the estuaries of the Dee and Mersey respectively?

7. Compare the aeroplane photograph on page 111 with Figs. 24 and 25.

Note (1) the coastal plain rising to the plateau;

(2) the G.W.R. main line to Fishguard behind the Works;

(3) a corner of Port Talbot Harbour (with dredger);

(4) railways bringing in coal from the coalfield;

(5) the long white "bunkers" in which the imported iron ore is stored till required in the furnaces;

(6) the tall cylindrical "stoves" in which air is heated for blowing into the furnaces;

(7) the houses of the workers forming a new town;

(8) the trees on the lower slopes of the hills reaching to the 400 feet contour line.

CHAPTER XIII

THE SCOTS BORDERLAND

This region is about as large as Wales and very similar to it in physical features. It consists of a plateau of hard, slaty rocks much scarred by the action of ancient glaciers and cut up into separate masses by river valleys (Fig. 26). No point is as high as Snowdon or even as Sea Fell or Cross Fell, but much of the land is over 1,000 feet above sea level, and there are several points from Merrick to the Cheviots over half a mile in height. The rounded moors are very bleak in winter and the grass and heather which cover them make them only of value as sheep pastures.

The valleys or dales, as they are here called, as in the Pennines, are more fertile and very picturesque, the "braes" or slopes being often well wooded. In the valleys good mixed farming is carried on, and a woollen industry has grown up passing through the various stages from a home industry carried on by hand labour to a factory industry with modern machinery, as in the West Riding of Yorkshire, only on a much smaller scale. *Hawick* and *Galashiels* and other small market towns in the Tweed valley have become famous for their "tweed" cloth, but all of them together would not equal in size or output one of the larger Yorkshire woollen towns. But as the towns are smaller and there is no local coalfield the scenery has fortunately not suffered so badly as in the dales of the West Riding. The moister lowlands from Ayrshire round to Solway Firth are famous cattle pastures.

The beauty of this region, the life of its people, and the stirring scenes it witnessed in the days of border warfare between English and Scots, have been made famous by the poems and romances of Sir Walter Scott who lived at Abbotsford, and the poems and songs of Robert Burns who lived and died at Dumfries.

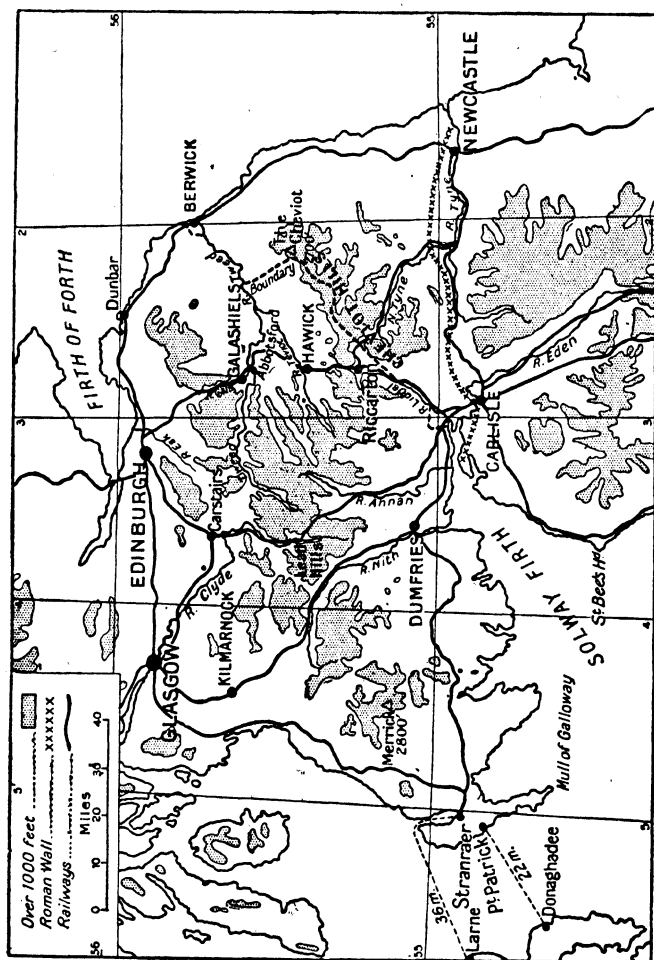


Fig. 26.—Routes across the Border.

ROUTES ACROSS THE BORDER

All the ancient and modern routes connecting the lowlands of England and Scotland passed round or through this region. The east coast route is shortest and easiest, and where it crossed the Tweed at Berwick and was hemmed in between the uplands and the sea at Dunbar much fighting took place in ancient days. One line of the London and North-Eastern Railway follows this route to Edinburgh to-day. Another line of this system branches off at Newcastle and follows the North Tyne into the Cheviots, where at Riccarton Junction it meets another branch which has come from Carlisle up the Liddel valley. It then continues the "Waverley Route" through the Scott country of the middle Tweed valley and reaches Edinburgh by the valleys of the Gala and Esk.

Carlisle is the great route centre of the west coast. This road was made difficult in ancient days by Solway Moss, the marshland around the head of the Firth, but it has since been drained and converted into good farmland. Besides the route through the Tyne Gap and the Waverley route already mentioned, two important lines of the London, Midland and Scottish Railway leave Carlisle for Scotland. The old Caledonian route ascends by Annan Dale to Beattock Summit in the Lead Hills and then descends the Clyde Valley to Carstairs, the junction for Glasgow and Edinburgh. Another route goes to the market town of Dumfries and there divides, one line following the coastal plain to the packet stations of Stranraer and Port Patrick, and the other crossing the Southern Uplands by Nithsdale to Kilmarnock and Glasgow.

QUESTIONS AND EXERCISES

1. Draw a sketch map to show the various railways which converge on Carlisle. Mark alongside each the name of the river valley which it uses.
2. Account for the growth of Dumfries and illustrate by a sketch map.
3. Why did not the Southern Uplands of Scotland become the home of a separate race of people as Wales did ?

4. What natural features form parts of the present boundary of England and Scotland? Is Berwick English or Scotch?

5. Which is likely to form a better frontier between two countries, an uninhabited moorland or a navigable river? Why?

6. Describe the route from Berwick to Glasgow across the Southern Uplands.

7. What facts have favoured the growth of the woollen industry at Galashiels?

8. Where do the mail packet steamers run to from Stranraer?

9. What was the length of the Roman Wall? When was it built? For what purpose?

CHAPTER XIV

THE LOWLANDS OF SCOTLAND

PHYSICAL FEATURES AND INDUSTRIES

This is by far the most important region of Scotland, for it contains four-fifths of the total population of that country. It consists of the lower portions of the valleys of the three great rivers Clyde, Forth and Tay, and the coastal plains along their "firths" or estuaries. It is hardly a lowland area except in comparison with the lofty Highlands to the north and the Southern Uplands along the English border. A glance at the map will show that running across the Lowlands parallel with the edge of the Highlands is a line of hills—the Sidlaws, Ochils, Campsie Fells and Renfrew Hills—most of which rise to a height of 1,000 feet, with several points much higher than that. These hills are of hard rock which probably issued as lava from volcanic craters in prehistoric times. A similar line of old volcanic hills borders the Lowlands in the south, the Pentland Hills running south-westward from Edinburgh being well known.

But although these hills are picturesque and interesting, they are, of course, not nearly so valuable as the broad valleys or "straths" that lie between them. For these have always been the most fertile parts of Scotland, making good corn-lands in the east and rich cattle pastures

in the wetter west. Good wheat is grown in Fifeshire, and Ayrshire dairy cattle are famous. Clydesdale is famous for a breed of heavy cart horses, and the hills, of course, afford pasture for sheep.

Thus, until a century ago, this region resembled the English plain with its farming villages and market towns, a few of which more favourably situated, such as Edinburgh, Perth, Stirling and Glasgow, had become rather more important than the rest. Then came the discovery of the use of coal, and it was found that in Scotland the richest seams of coal and iron ore were also in the Lowlands underlying the fertile fields. The enterprising inhabitants were not slow to realize their value, with the result that this region has now become one of the most famous manufacturing areas not only of Britain but of the world.

As on the English coalfields, the peaceful rural landscape is now disfigured by mining rubbish heaps and winding machinery, blazing blast furnaces, and the smoky chimneys of factories where textiles, machinery and countless other manufactured goods are made in large quantities for home use and export. Large crowded towns have sprung up on the coalfields and the estuary of the Clyde is lined with its world-famous shipyards, where vessels of every kind and size are built and equipped for sea. As the methods employed in these industries are similar to those in England, we will not use space in describing them again, but will study a few of the larger cities and towns.

CITIES AND ROUTES

Glasgow, with over a million inhabitants, contains about a quarter of the population of Scotland and is the second largest city in Britain. This has not always been so, for although it grew to importance in early times as the centre of a fertile region at the lowest bridge-point and tidal limit of the Clyde estuary, in those days the western part of Britain was much less important than the east. But after the discovery of the New World in the fifteenth

century, it developed a trade with the West Indies and North America and, like Bristol, has tobacco and sugar industries dating from those days.

Then came the opening up of the rich Lanarkshire coalfield with its great iron and steel industries, and the artificial deepening of the Clyde by its enterprising inhabitants in the latter part of the eighteenth century. This encouraged the shipbuilding industry along the lower Clyde and also increased the possibilities of trade with America. Like Liverpool, Glasgow became a big importer of American cotton, and Lanarkshire, like

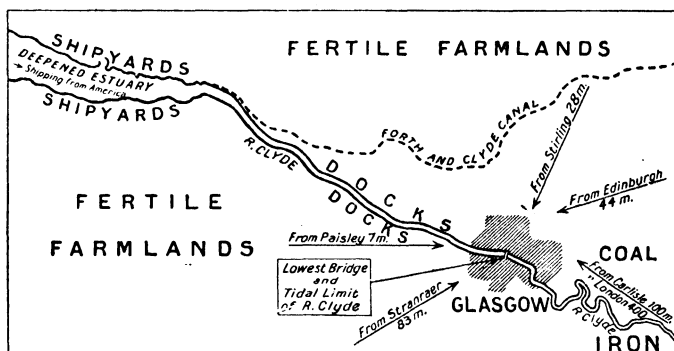
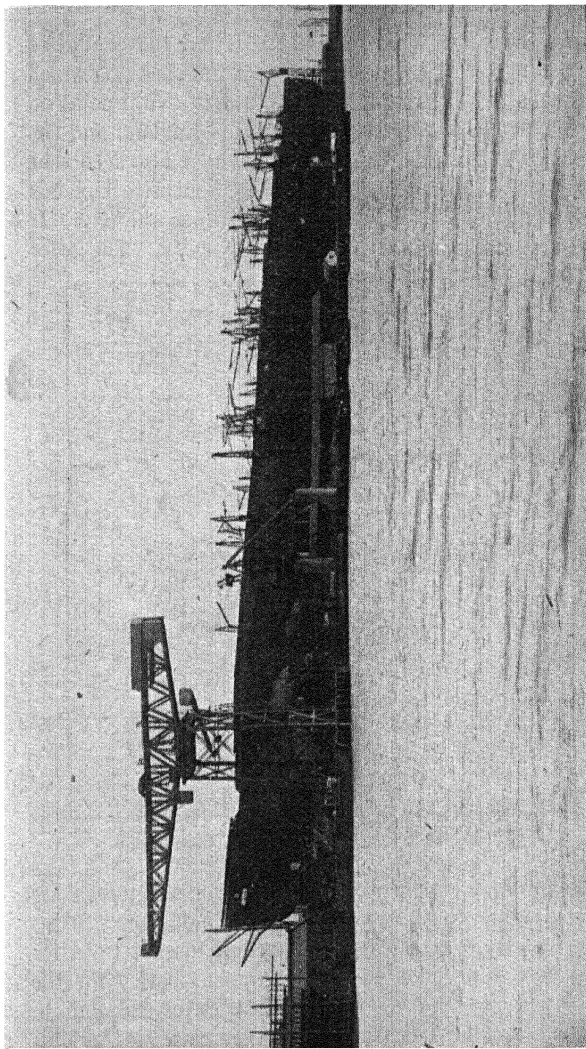


FIG. 27.—Factors in the growth of Glasgow.

Lancashire with its damp climate, established important cotton-spinning and weaving industries as well as the woollen industry for which it had all the materials close at hand. The building of railways, radiating in all directions over the Lowlands and across the Uplands to England, and the construction of the Forth and Clyde Canal have added to its importance (see Fig. 27).

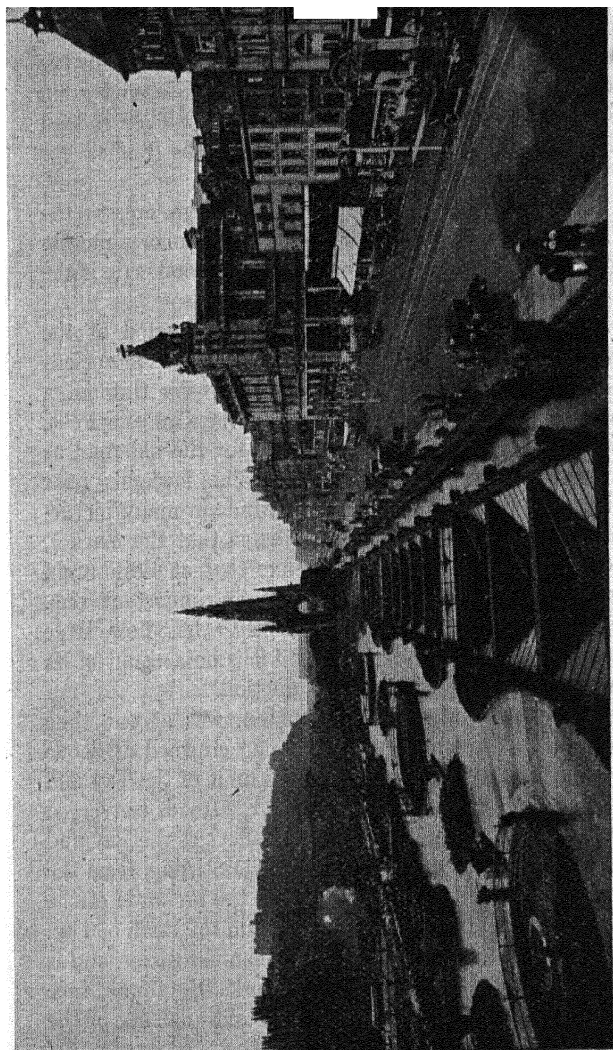
Other important towns near Glasgow are *Airdrie*, *Hamilton*, *Coatbridge* and *Motherwell*, famous iron-working centres; *Paisley*, noted for its textile industries and the making of sewing cotton and thread; *Dumbarton* and *Greenock* with large shipbuilding yards.



[Photo : Topical P.A., Ltd.]

IN A CLYDEBANK SHIPYARD.

The *Queen Mary* on the slipway before launching. Notice the cranes used in the construction. Why is the ship almost parallel to the river bank ? Compare it in size with the ferry boat.



[Photo : L.M.S.R.]

PRINCES STREET, EDINBURGH.

Notice the Castle Rock and below it the National Gallery and the Scott Monument. The L.N.E.R. station is below the street level in the foreground.

ships may be seen unloading imports of wood pulp from Norway and esparto grass from Spain and Algeria for the paper mills, timber from the Baltic countries, and grain and flour from many parts of the world. They re-load with coal and manufactured goods from the coalfield for export.

The route to the north from Edinburgh crosses the Forth at Queensferry by a fine iron bridge over a mile in length, and just above the bridge on the north side is the famous naval station of Rosyth.

Stirling is another famous old town situated at the lowest point on the Forth that could be bridged in ancient times. At this point also the river breaks through a natural gap between the Ochils and the Campsie Fells, and this gap afforded an easy route for the old road as it does for the modern railway. The lowlands near Stirling, through which the Forth winds in many picturesque "links," are also very fertile, so that the market, protected by the castle, which, like that at Edinburgh, crowns an old volcanic rock, was an important one. Helped by the local coalfield, Stirling has now large woollen and leather industries, and it is on account of its position an important railway junction.

Perth, somewhat similarly situated, was at one time a capital of Scotland, the kings being crowned at Scone near by. Note that it was the tidal limit of the Tay and, in olden times the lowest bridge-point. Roads converged upon it from the Highlands by the valleys of the Tay and Earn, from Glasgow and Edinburgh via Stirling, from the fertile plain of Strathmore, and from the orchards of the Carse of Gowrie between the Sidlaws and the Firth of Tay. It has a large sheep market and woollen industries, and is known all over Britain for its dye works, the importance of which is partly due to the quality and quantity of the Tay waters.

Dundee, more favourably situated on the firth for larger shipping, and at the end of the modern steel bridge across

the Tay, has become much more important in recent years, and is the third largest town of the country. Coal can be obtained easily by rail or sea from the Fifeshire coalfield only 20 miles away, and it has developed several important industries. Locally grown flax led to a linen industry. More flax was imported from Russia and other Baltic countries and with it hemp—another fibre obtained from the stems of a plant. This makes the strongest ropes for ships which sail from Dundee to the fisheries of the Dogger Bank. Dundee has now large industries in making up of jute fibre obtained from Calcutta into rope, sacking, sailcloth and floorcloth; and jute can also be used sometimes as a substitute for flax. The jam and marmalade industries for which Dundee is famous started with the fruit from the Carse of Gowrie, but, of course, the oranges have to be imported, mainly from Spain and other Mediterranean countries.

Kirkcaldy and *Dunfermline*, on the Fifeshire coalfield, have also linen and jute industries.

In the south-western part of the Lowlands is the Ayrshire coalfield. Much of the coal raised is exported to Belfast for use in the linen factories and shipyards there, but at *Kilmarnock*, on the coalfield, are important engineering works and woollen mills.

QUESTIONS AND EXERCISES

1. Indicate on sketch maps as far as possible the reasons for the growth of Glasgow, Edinburgh, Stirling, Perth and Dundee.

2. Show how the typical industries of different English coalfields are all found together on the Forth and Clyde coalfield.

3. Why was Edinburgh a larger city than Glasgow until modern times? Why has the latter overtaken the capital?

4. Compare the distribution of population in England and Scotland respectively.

5. Explain the saying that "Glasgow made the Clyde and the Clyde made Glasgow." How far is it true?

6. What would be the advantages of converting the Forth and Clyde Canal into one large enough for big modern ships?

7. Describe briefly any well-known railway route from London to Edinburgh.

CHAPTER XV

THE HIGHLANDS OF SCOTLAND

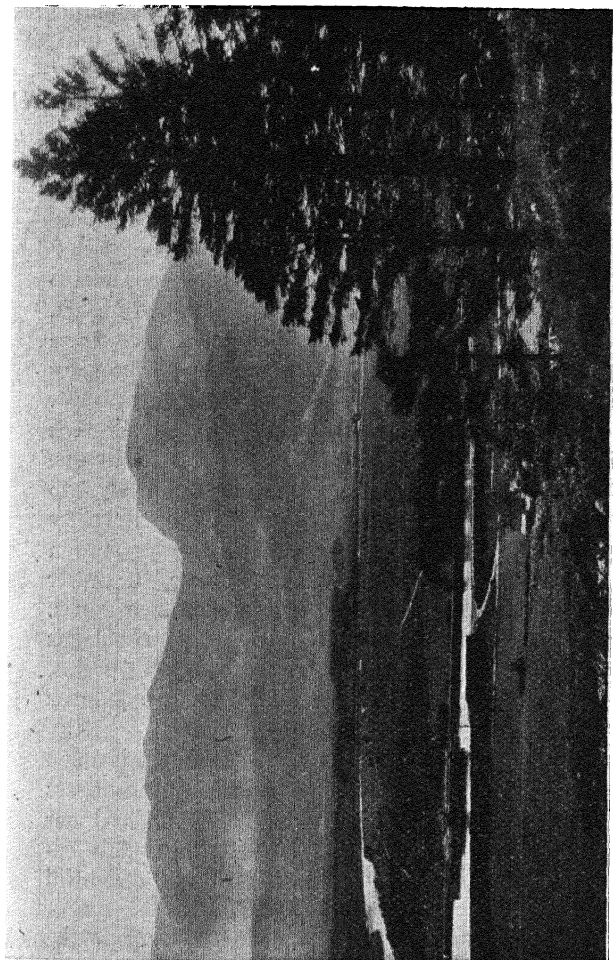
This region, although covering more than half of Scotland, does not contain as many people as a moderate-sized city of the Lowlands, and is mainly famous for its glorious scenery, which makes it a holiday resort not only for the Lowland Scots but for many lowlanders who live across the Border.

BEN, GLEN AND LOCH

A glance at the map shows that most of the area is more than 1,000 feet above sea level, and it is really an old plateau of very hard rocks—granite, gneiss, schist, slate and old red sandstone. But being a high land mass in the track of the prevalent westerly winds from the Atlantic it has a very heavy rainfall (*see* page 29), and the rain running over the plateau and collecting into streams and rivers has in the course of ages broken up the rocks and cut out deep valleys or “glens.”

In ancient days the climate was probably much colder than it is now, and the highlands were covered with snow. Glaciers, formed by the compression of snow into ice, moved slowly down the glens, deepening them and smoothing their rocky sides. The harder rocks withstood this “weathering” by the rain, running streams and glaciers, and here and there, rising above the general level of the plateau, may be seen a rugged peak or “ben.” Ben Nevis, more than 4,000 feet above sea level, is the highest point in Britain, but there are several others almost as high.

The greatest of the glens is Glen More, which runs right across the Highlands, separating the Grampians on its south side from the northern Highlands. The sides of the glens are sometimes well wooded with pines and silver birch, but in places the soil is so poor that only coarse



[Photo : L.M.S.R.]

BEN NEVIS WITH GLEN MORE AND THE CALEDONIAN CANAL.
Compare the trees with those shown in the picture on p. 87,

grass and heather will grow. The moors on top of the plateau are too barren and windy for trees, but the purple heather in late summer gives them a glory of their own, while the grouse and deer provide sport for wealthy holiday-makers. The soil on the floor of the glens is often fertile and makes good cattle pasture, but the cool damp climate makes potatoes and oats the only thriving crops.

Where a glen has been deepened by glacier action, or blocked up by rock rubbish deposited when the glacier melted, the water collects in a long narrow lake or "loch" which may be many miles in length. These lochs add to the beauty of the glens and give much pleasure to anglers. In Glen More three lochs—Ness, Oich and Lochy—have been connected by the Caledonian Canal, which provides a route for small boats from the east to the west coast. Owing to the unproductive nature of the region this is mainly a pleasure route for tourists, but the picturesque Falls of Foyers, which descend from the Highlands into Loch Ness (Fig. 29), are now utilized to supply electricity for aluminium works. A hydro-electric power station has also been established near Fort William, the water being carried by way of a tunnel through Ben Nevis. Loch Katrine, in the beautiful part of the Highlands known as the Trossachs, made famous by Scott's poems, is now a reservoir of drinking water for Glasgow 30 miles to the south!

The glens of the western Highlands have been invaded by the sea, forming sea lochs, while the higher masses have been left standing as the island fringes of the Inner and Outer Hebrides. These lochs and the sounds between the islands and the mainland afford delightful summer cruises for yachtsmen, while the sea fisheries of this coast are also valuable. Many of the islands of the Inner Hebrides are covered with an old volcanic lava called basalt which in places has solidified into huge black six-sided pillars. Fingal's Cave on the little Isle of Staffa is a famous example of this.

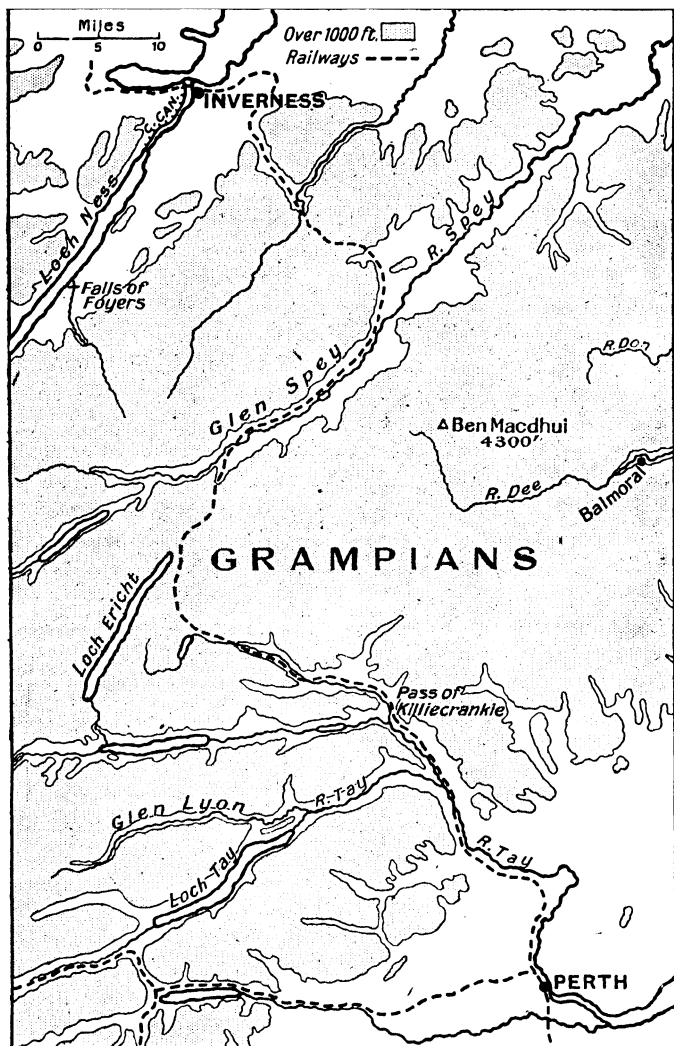


FIG. 29.—The Route through the Highland Glens from Perth to Inverness.

THE HIGHLANDERS

The few permanent inhabitants of this picturesque but often inhospitable region have a hard struggle for existence, but this struggle has made them strong, fearless, self-reliant, intelligent and thrifty, and many children born in the small stone cottages of the Highland glens have risen to the highest positions in every branch of life. The "crofters" or small farmers live mainly on the oat-meal, potatoes, milk, butter and fish which the region produces, for communication with the outside world is always difficult and in winter often impossible. A few sheep are kept, mainly for their wool, which is either made into the coarse homespun tweeds, such as those for which Harris in the Hebrides is particularly famous, or is sent to the woollen mills of the Lowlands. The absence of coal, and in many parts even of wood, compels the crofters to cut peat from the swamps on the mountainsides for fuel. The peat consists of the decayed stems and roots of the mosses which grow in these swampy parts.

The isolation of the glens tended to make the Highlanders very clannish, loyal and helpful to members of their own clan or family group, but suspicious of outsiders, and as in Wales the real Highlanders have a language of their own—Gaelic.

THE EAST COAST PLAIN

This, although it borders the Highlands, is not part of them, and the inhabitants of the plain largely descended from Danes and Saxons like the people of the Lowlands and the English Plain, and, having easier communication with the rest of the country, are not so distinct in character as the Highlanders.

The plain is fairly fertile, and although the summers are hardly hot enough for wheat to ripen, good crops of oats and barley and roots can be grown and many cattle are reared, those of Aberdeen being noted for their beef. Much barley is used in the whisky distilleries.

Where spurs of the Highlands come near to the sea the hard rock is quarried for local use and export. It is used for building purposes and making docks, wharves, kerbstones and monuments. Aberdeen city is almost entirely built of grey granite, and the red granite exported from Peterhead is well known.

Most of the small villages along the coast take part in the herring fisheries close inshore, and the larger ports send out trawlers to the Dogger Bank (*see* p. 80). The Spey, Dee, Don and other rivers that cross the plain are famous for their salmon.

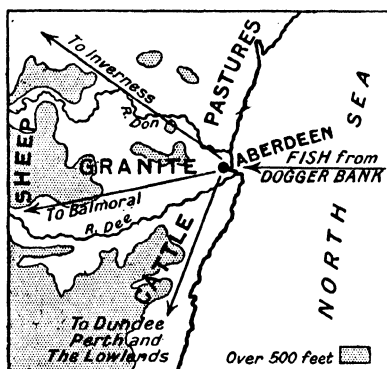


FIG. 30.—Factors in the growth of Aberdeen.

The county towns of all the Highland counties except one—Argyllshire—lie on this coastal plain, but with the exception of Aberdeen and Inverness they are very small.

Aberdeen, the largest city of the region, owes its importance to its position. Its name shows that it is at the mouth of the Dee, whose valley penetrates one of the most picturesque portions of the Highlands. In its valley lies the Royal Castle of Balmoral. The mouth of the river has been made into a good harbour for the fishing fleet and the ships that come for granite. The east coast

road to the north of Scotland crosses the river by a bridge at Aberdeen, while road and railway from the Don valley also converge upon the city (Fig. 30). It has an old Cathedral and a famous University, both built of granite.

Inverness, although relatively small, is sometimes called the capital of the Highlands, and owes its importance to its situation at the junction of the east coast route with the natural land and water routes of Glen More. It is also on the picturesque tourist route of the Highland railway (Fig. 29) which threads the Highlands by way of Glen Spey, Glen Garry, the Pass of Killiecrankie and Glen Tay to Perth. North of Inverness the railway follows closely the shores of Cromarty and Dornoch Firths to the fishing ports of Wick and Thurso, sending out a branch from Dingwall to Strome Ferry, the landing place of the fishing catch of the Outer Hebrides.

QUESTIONS AND EXERCISES

1. What are the relative advantages and disadvantages of the Highlands as compared with the Lowlands of Scotland?
2. What interesting holiday excursions could be made from Fort William as a centre? Describe the means of travel in each case.
3. Why is there no west coast railway route in Scotland?
4. Why might the Highlands become more important when the coal supplies of the Lowlands are used up?
5. Find from a map the routes by rail and sea respectively between Glasgow and Oban.
6. What are the advantages and disadvantages of the life of a Highland crofter as compared with that of a Lowland factory worker?

CHAPTER XVI

NORTHERN IRELAND

This portion of the "sister isle" of Ireland is still a part of the United Kingdom and, unlike the Irish Free State to the south, still sends members of Parliament to Westminster. It consists of the five counties that lie

around Lough Neagh, and also the county of Fermanagh which surrounds Upper and Lower Lough Erne (Fig. 31).

The lowlands around Lough Neagh and the river Bann which drains it are very fertile and produce good crops of oats, barley and flax. It is the flax which has made this part of Ireland famous for its linen.

Flax is a slender plant about 3 feet tall produced from linseed, and it is from the strong outer fibres of the stem that linen is made. When the seed is ripe the plants are

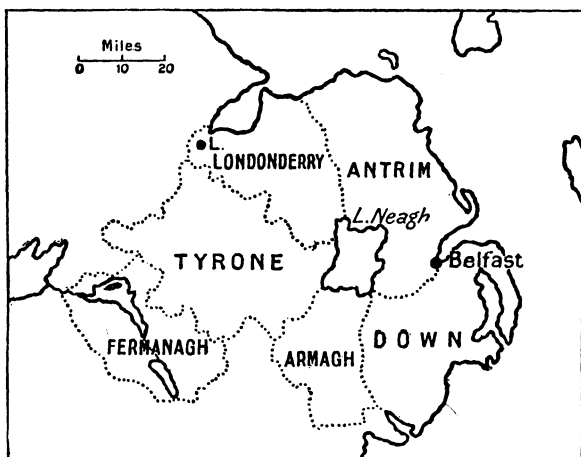


FIG. 31.—The six Counties of Northern Ireland.

uprooted, the seeds are “rippled” out, and the stems are then tied in bundles and “retted” or rotted by laying them in tanks of water for some weeks. The nature of the water is important in this process; and the freedom of the Ulster streams from iron and lime has favoured the industry. After the rotting the fibres can be easily separated from the brittle and useless core of the stems. After this it undergoes various combing processes before it is ready to be spun into yarn. Then comes the bleaching and weaving it into the fine white linen such as is

used for making sheets, tablecloths, handkerchiefs and collars.

All these processes were once carried out by hand, but machinery similar to that used in the cotton and woollen industries already described is now used for most of the spinning and weaving. Power for driving the machinery is obtained from coal, and as the supplies of the small coalfields of Northern Ireland are quite insufficient for the

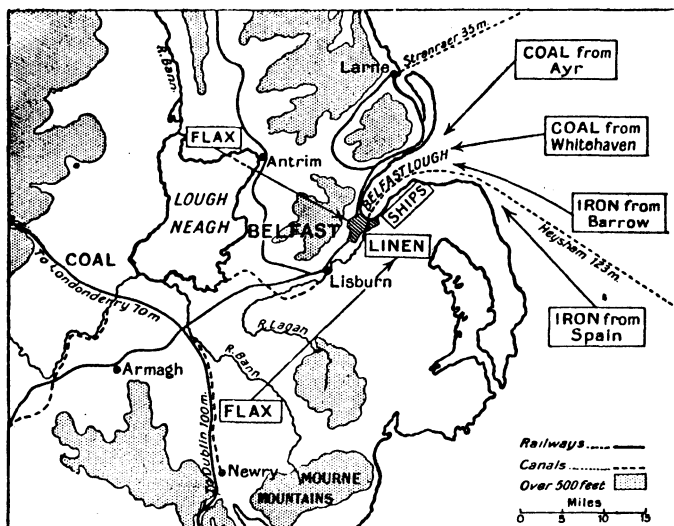


FIG. 32.—Factors in the growth of Belfast.

purpose much is imported from Ayrshire and Cumberland. The ports such as Belfast and Londonderry, most favourably situated to receive the coal, have, therefore, become the chief centres of the linen manufacture.

Belfast, the largest city and capital of Northern Ireland, has also an important shipbuilding industry, most of the huge White Star liners having been built on the shores of Belfast Lough. The bulk of the iron and coal used in this industry is imported, the iron from the Furness

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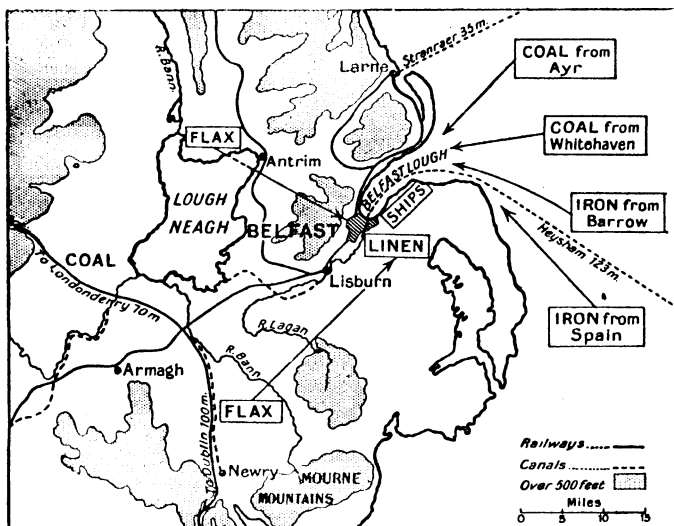
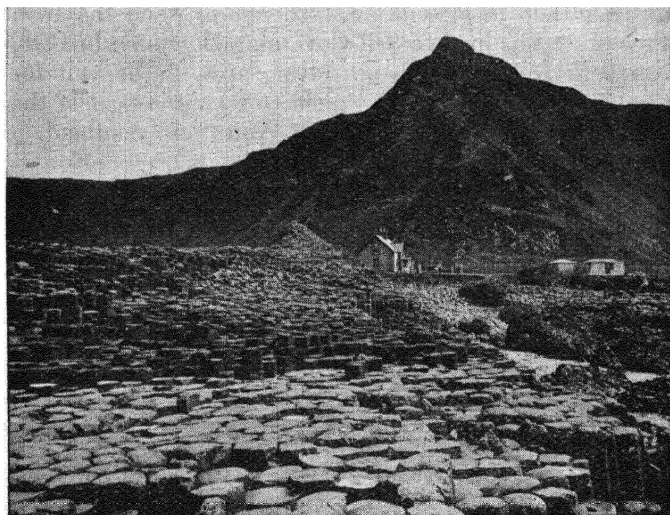


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District of Lancashire and from Northern Spain, and the coal from the Ayrshire and Cumberland Coalfields. Belfast has also whisky distilleries and tobacco factories besides its great linen industry. It has direct mail and packet boat services with Great Britain via Heysham, and rail and boat services via Larne and Stranraer and via Greenore and Holyhead. Other important rail routes



[Photo: L.M.S.R.]

THE GIANT'S CAUSEWAY.

An old lava flow. Notice the hexagonal pillars of basalt into which the lava has solidified.

run from Belfast (1) to Londonderry, sending out a branch to the famous Giant's Causeway, whose basaltic pillars resemble those of Fingal's Cave (*see* p. 126), and (2) to Dublin, with branches to the beautiful Mourne Mountains (Fig. 32).

The other towns of Northern Ireland are mainly market towns, some of which have also a linen industry. *Moyle* on Lough Foyle is a port of call for ships crossing the

Atlantic from Glasgow to Canada or the United States, to which countries considerable numbers of Irish people emigrate each year. The people of Northern Ireland are largely descended from English and Scotch colonists who settled there in the seventeenth century. Unlike the bulk of the people in the rest of Ireland they are, therefore, Protestant in religion, prefer to be united with Britain, and are more interested in manufacturing industries than in agriculture. Therefore, when the Irish Free State was made a Self-Governing Dominion in 1923, Northern Ireland, although setting up a Parliament for local affairs in Belfast, continued to remain a part of the United Kingdom with England, Wales and Scotland.

CHAPTER XVII

THE IRISH FREE STATE

This Self-Governing Dominion of the British Empire covers all the Emerald Isle that lies outside Northern Ireland. It consists of the great central plain and a number of isolated mountain groups in the west, south and east.

LOUGHS AND BOGS

A glance at the map shows on the central plain a large number of big shallow lakes which are really only widenings of the many rivers that wind slowly across it. Most of the surface of the plain consists of limestone which has in places been dissolved away, leaving large shallow basins occupied by the loughs, as these lakes are called. In some of these hollows the water having no outlet became stagnant, and in time filled with water-plants and moss. The accumulation of decayed vegetation and mud year after year resulted in the formation of bogs, vast areas of spongy "peat" green or brown in colour according to

the season. No less than 4,000 square miles of Central Ireland are covered with these peat bogs, the largest single area being the Bog of Allen.

Bogs also form in hollows on the mountainsides, and occasionally after heavy rains these "burst" and overflow down the slopes, doing much damage to crops and houses and often drowning animals and people. As the bogs of the plain are often 20 to 30 feet in depth they are a great obstacle to the construction of roads and railways; and, of course, they are also a source of danger to men and beasts who may approach them unawares. But if the bogs can be drained the peat can be cut out in lumps and dried and then makes a very fair fuel. A stack of "peats" for the winter can be seen alongside each little stone- or mud-built dwelling in the country districts, for wood and coal are both scarce in Ireland.

DAIRY FARMING AND OTHER INDUSTRIES

More than half the central plain is, however, covered with fine pasture owing to the mild damp climate of the country. Cattle and dairy produce are, therefore, the chief productions of the country, shiploads leaving the country every day to feed the great manufacturing populations in the lowlands of England, Scotland and South Wales. The preparation of the butter and cheese for market is now being undertaken on a larger scale by central co-operative creameries, to which the small farmers of the surrounding districts send their milk. The skimmed milk makes good food for pigs, and Irish bacon has a good reputation. There is no reason why Ireland should not become as prosperous as Denmark as the result of the enterprising development of its dairy farming.

Owing to the heavy rainfall the growing of crops is less important than the pastoral industries, but in the drier eastern districts considerable crops of oats and barley are

raised, the latter being mainly used in the whisky distilleries. Potatoes are grown in all parts, and in the poorer districts form the chief food of the people. A potato famine in Ireland is disastrous.

The Free State is badly off for minerals. The only coalfield lies on the borders of Kilkenny and Leix, formerly called Queen's County, and is not very productive, so that most of the fuel used on the railways and in the few factories has to be imported from Britain.

POPULATION, TOWNS AND ROUTES

Owing to the facts that there are no large manufacturing districts and that the uninhabitable mountain regions are small, the population of the Free State is more evenly distributed than is that of any other part of the British Isles. The poverty of the peasants has already been referred to: this is especially bad in the western mountain districts where soil and climate are worst. Many of the houses are just single-roomed hovels built of stone or mud, thatched with straw, heated in winter by cheerless smoky peat fires, and shared by people, pigs and poultry. The coastal folk eke out their scanty living by fishing, and a few, especially in Donegal, still make the famous homespun "tweeds" from the wool of the mountain sheep. These cloths often smell of the peaty atmosphere in which they are made.

Scattered over the plain at the meeting points of rivers, roads, railways or canals are small market towns where animals and dairy produce may be sold to provide the means to buy boots and clothes and household goods. But as Ireland mainly lives by exchanging its surplus farm produce for British manufactured goods, the largest towns are all seaports, most of which are naturally on the side of Ireland facing her best customer.

Dublin (Fig. 33) is the largest city and the capital of the

Free State. It owes its importance to its good harbour at the mouth of the Liffey, its central position on the east coast, and the number of land and water routes that converge upon it. Note the following routes :

- (1) The Royal Mail route from Dun Laoghaire to Holyhead ;
- (2) The important commercial route to Liverpool for the busy industrial districts of South Lancashire and the Midlands ;

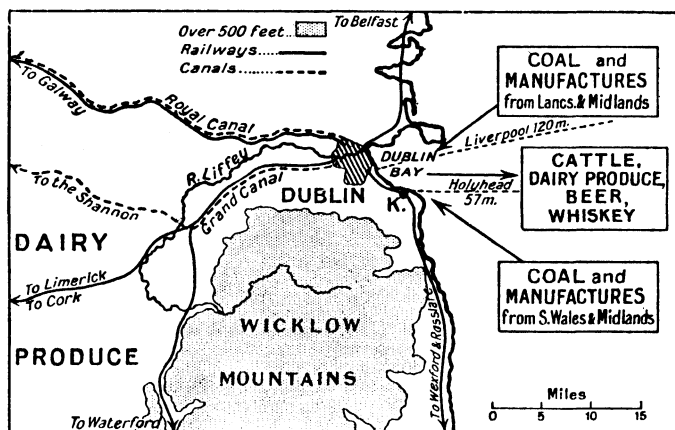


FIG. 33.—Factors in the growth of Dublin.

(3) The Royal and Grand Canals across the central plain to the Shannon, the longest river of the British Isles ;

(4) The Great Southern and Western Railway to the Kilkenny coalfield, the fertile Golden Vale of *Tipperary*, the beautiful district of Killarney, and the important cable and meteorological stations of Valentia Island ;

(5) The Midland Great Western Railway crossing the central plain to the fishing port of *Galway* and the important wireless station of *Clifden* ;

(6) The Great Northern Railway to *Drogheda*, *Dundalk* and *Belfast* ;

(7) The railway southward to the picturesque resorts of the Wicklow Mountains, and the packet station of *Rosslare* communicating with London via Fishguard.

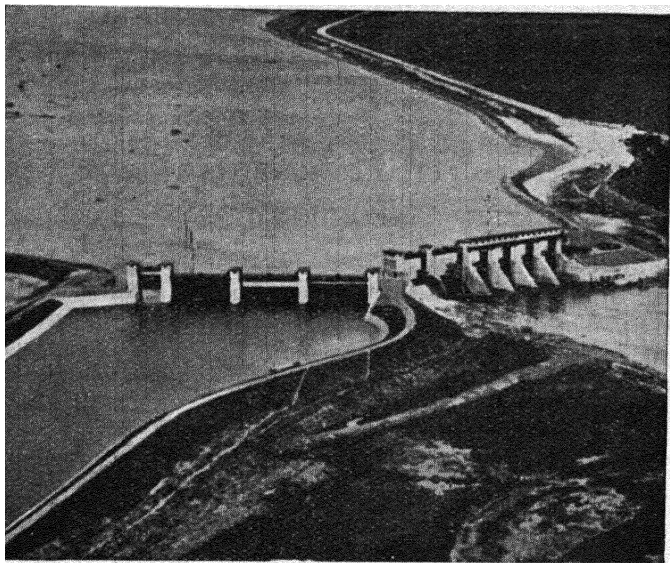
Dublin has two universities and famous breweries and distilleries.

Cork has a fine harbour at the estuary of the Lee, and collects and prepares for export much of the dairy produce of the Golden Vale, to which it has access by the gap through the mountains at Mallow traversed by the Great Southern and Western Railway. It also makes agricultural implements. Most of its exports go to Bristol. *Cobh*, formerly called Queenstown, on an island in the harbour, is a port of call for liners between Liverpool and North America.

Waterford, with a fine harbour and access to the central plain by the three rivers that enter it, is also a big exporter of butter and cheese, bacon and eggs.

Limerick, at the head of the estuary and lowest bridge-point of the largest river and with the finest pastures of Ireland behind it, also exports dairy produce, but its position on the west coast makes it less important than it otherwise would be. It still retains a famous old lace industry and prepares condensed milk for export.

As Ireland is deficient in coal and has to import practically all that she uses, attention has recently been paid to the development of electricity by water power. By far the largest scheme in the whole of the British Isles is that of harnessing the river Shannon. A dam has been built across the river just below Lough Derg raising the surface of this lake to 110 feet above the mean level at Limerick. The water from the lake is conveyed by means of a canal to the power station near Limerick where three turbines are at present in use to generate the electricity, three more being in course of construction. The electricity thus supplied is carried by overhead cables to practically all parts of the Free State. When the scheme is completed, the electricity provided will be sufficient not only



[Photo : Siemens-Schuckert (Great Britain), Ltd.]

THE SHANNON HYDRO-ELECTRIC SCHEME.

The picture shows the dam built across the Shannon, with the entrance to the intake channel leading to the power station on the left and the overflow weir on the right.

to supply all light required and to maintain existing manufactures, but will also allow a considerable expansion.

QUESTIONS AND EXERCISES

1. Why is Ireland called the Emerald Isle ?
2. While the population of Great Britain has doubled in the last fifty years, that of Ireland has decreased by a third. Can you think of any reasons for this difference ?
3. Compare the distribution of population (a) in Scotland and in Ireland, (b) in Northern Ireland and the Free State respectively.
4. Draw a sketch map to show the packet stations of Great Britain and Ireland which have connection with each other. Measure and mark the respective distances of the routes. Which railway in Britain serves each of them ?
5. Which parts of England would most likely consume Irish produce landed at Bristol ? How could it reach them ?
6. Why is the meteorological station at Valentia so important ?
7. Describe the tourist routes from London (a) to the lakes of Killarney, (b) to the Giant's Causeway.

8. Which parts of Great Britain are in any way similar to certain parts of Ireland as regards scenery or occupations of the people?
9. Why is the climate of Ireland mild? Why is it damp?
10. Compare the imports and exports of Dublin and Belfast.

CHAPTER XVIII

LONDON

We have left till last the study of the great capital city of Britain and the Empire. For although it forms a part of two of the regions which we have previously studied, it does not belong to them any more than it does to all the

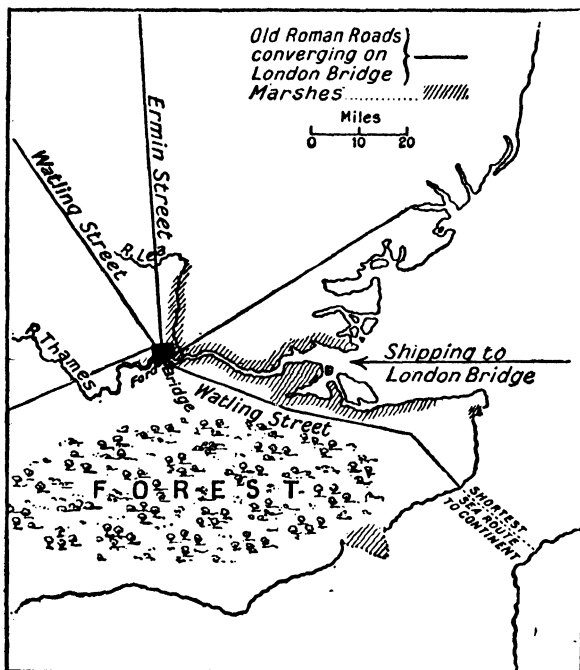


FIG. 34.—Geographical Factors which helped to determine the site of London.

others. As they have developed so London has grown, till now within the circle of what is known as Greater London live some eight million people, as many as in the next twenty-five largest cities of Britain added together. To understand how this has come about we must study the past as well as the present.

When the Romans landed near Dover their road into the country was restricted between the dense Wealden forest to the south and the wide marshes bordering the Thames to the north (Fig. 34), and the first place at which they could reach the river on fairly firm land and ford across it on foot was near the present site of Westminster. Later, they came up the Thames in boats and the same ford set a limit to their navigation. Here, then, they established a settlement, choosing a spot on the north side of the river, where higher, firmer land came close to the shore, and the Thames on the south and the broad marshes of the Lea tributary on the east rendered it fairly secure from attack. For it must be remembered that in those times there were fairly strong tribes of the Ancient Britons living in their stockaded villages in the fertile plain of East Anglia.

The Romans built the first London Bridge, and from it laid out a system of roads across the English Plain, so that they could move their legions along them and subdue the country. They enclosed the city with a wall, and this security added to the bridge and converging roads soon led to London becoming the great market place of South-eastern England. It must be remembered, too, that in those far-off days the north and west of the country were of little account, for bleak highlands and forested lowlands were the homes of few settlers indeed.

In Saxon and Danish times London was sometimes eclipsed by Winchester, but by the time of the Norman Conquest it was again the chief city of the country. The walls were restored and such familiar names as Ludgate, Aldgate and Moorgate within the square mile of what is

called "The City" of London remind us of their existence (Fig. 35), while "The Tower," built by the Conqueror to overawe the city, still remains. St. Paul's Cathedral crowns the hill beside the river which was the original site of London. The King's Palace, the old West Minster, in whose Abbey church the kings were crowned and some of them are buried, and the Houses of Parliament lay outside

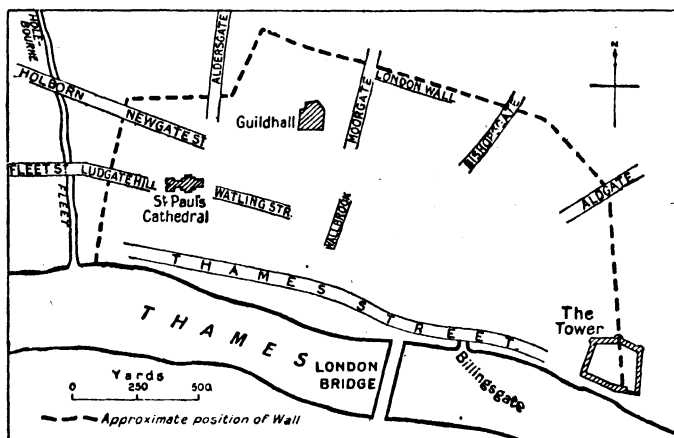
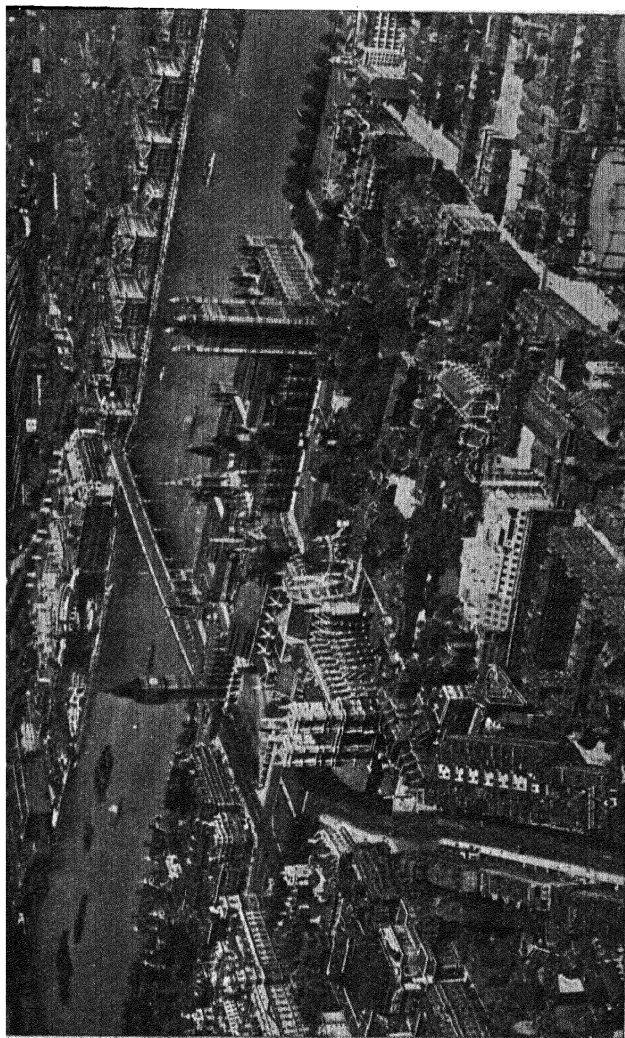


FIG. 35.—Some present street-names in the City of London dating from times when the City was enclosed by a wall.

the city walls. The road joining London to Westminster ran round "The Strand" or shore of the river, and the name is still used for part of this busy road to-day.

As the social and political centre of the country London continued to grow, but it had also become the centre of the small amount of foreign trade that was carried on in the Middle Ages. For this it was well placed, as the only trade in those days was with the countries of Western Europe, and the Thames opened to the North Sea opposite the mouth of the Rhine, the great river of the Continent.

Wool, practically our only export in those days, came long journeys from the West and South on pack-horses



[Aerograms Limited photo.]

"THE HEART OF THE EMPIRE."
(See Fig. 36, and Question 10, p. 149.)

to be bought in London by the merchants of Flanders, France and Italy, who brought in exchange cloth and wine from Europe and spices and precious stones brought overland from the East by camel caravans to the Mediterranean ports. Ships from the Baltic also came with products of the northern forest lands, bowstaves, tar, hempen ropes, salt pork and bacon, to exchange for English wool. The ships could not pass the low and narrow arches of London Bridge, so there they stayed to unload and there grew up the markets for the exchange of goods. And although London Bridge has been rebuilt several times so that barges and small steamers can pass beneath it, in the busy "Port of London" just below the bridge can still be seen every day large ships from abroad unloading their cargoes of every kind into great warehouses on the wharves or into lighters which carry the goods to storehouses or factories farther up stream.

But ships and trade in the last century grew beyond the capacity of the Thames at London, and bit by bit the marshland below the bridge was taken in to provide dock accommodation for loading and unloading vessels. The great loops in the river at Rotherhithe and Millwall were very useful for this purpose, but with the increase in the size of ships it became necessary to build still lower down the river at Tilbury docks for ships which could not proceed farther up stream. Even there docks have become outgrown and enormous extensions of them are planned for the near future.

Owing to the meeting of tides from the North Sea and the English Channel off the Thames Estuary there is a very strong tide in the river which helps to keep it clear of silt, but there is also a very great difference between the level of low and high tide, sometimes 20 feet. Therefore very big ships can only approach or leave the docks within about an hour of high tide. They must also go into closed docks for loading or unloading, for at low tide there would not be sufficient depth of water to float them.

Big efforts are being made to overcome some of these difficulties.

With the coming of railways, as London was already the capital and biggest city of the country, it was made the terminus of all the great lines (Fig. 36). Goods can therefore be readily brought to the docks from all parts of the country, and goods landed can be as readily distributed to consumers. This fact has also helped London to overcome the great modern difficulty of not being situ-

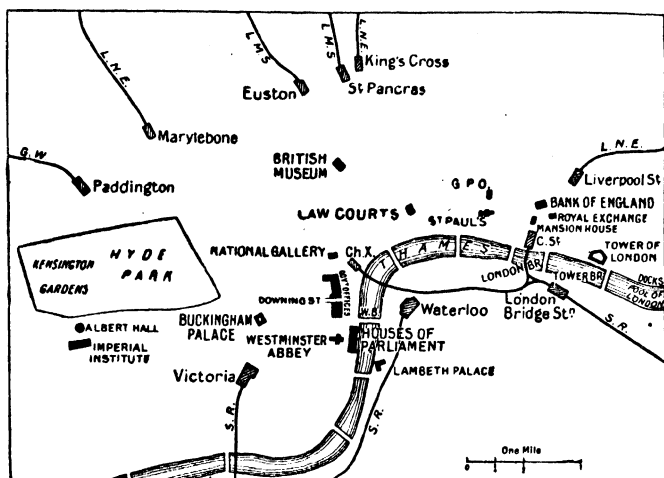


FIG. 36.—London as the centre of National life.

ated near a coalfield, the nearest being almost 100 miles away. So that besides being the chief seaport for the foreign trade of Britain, receiving a third of the total imports and sending out a quarter of the exports, London is now a great manufacturing centre for goods of all kinds, especially such as form the everyday needs of a local population of eight millions. Those occupying the greatest number of people are the clothing, boot and shoe, metal, furniture, paper and printing industries.

The steady growth of the British Empire has increased the importance of the capital, so that London has gradually become the greatest collection of docks, factories, ships, business offices, banks, schools, museums, churches, places of amusement, hotels and dwelling houses to be found on an area of similar size anywhere in the world (Fig. 36). The old square mile of the City of London, whose affairs are largely controlled by the Lord Mayor and Corporation, has expanded to the 117 square miles which form the County of London governed by the London

County Council ; and joining it, without any intervening country spaces, are many other large residential towns in Middlesex, Essex, Kent and Surrey which go to make up what is known as Greater London.

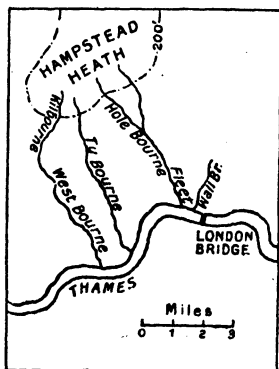


FIG. 37.—Ancient London's Streams.

The millions of workers, shoppers and sightseers are daily transported to and from their homes by a wonderful system of trams, 'buses, steam and electric railways ; and the soft clay on which London is built has allowed these means of communication to be supple-

mented by the most wonderful system of underground "tube" railways in the world.

The supply of pure water for such an enormous population is of course a great problem. In very early days the old city could rely on the many small streams which flowed towards the Thames from the sand-capped hill of Hampstead Heath (Fig. 37). But these streams are now built over and run in sewers, and only the names of streets and districts, such as Wall Brook, Fleet Street, Tyburn, Holborn, Kilburn, remain to remind us of them.

In the sixteenth and seventeenth centuries water was

obtained from the Thames by pumps on London Bridge, while the "New River," which still exists, was constructed to bring fresh water into London from springs in Hertfordshire (Fig. 38). But now about half the water used in London is taken from the Thames above Hampton Court, and the rest is obtained from deep wells dug through the London clay into the great layer of chalk, about 600 feet thick, which underlies it (Fig. 39). This chalk is saturated with water from rain which falls on the North Downs and

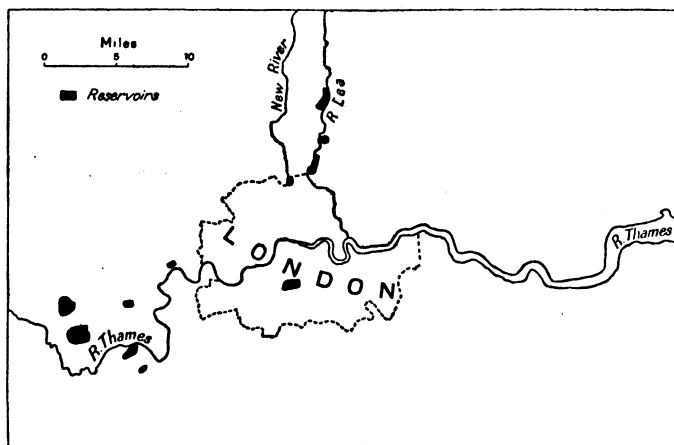


FIG. 38.—London's Water Supply: (a) Rivers.

the Chiltern Hills, which are simply the exposed edges of the chalk layer. After periods of drought—and London is in the driest part of England—there is sometimes a serious shortage of water from both these sources, and as London continues to grow it may be necessary to seek other supplies, even perhaps from the mountains of Wales.

The Thames has been shown to be the main cause of London's growth and the chief source of its water supply. It is also a great pleasure resort, especially above the city, where it winds peacefully through woodland and meadows

and past stately residences, whose well-kept lawns come down to the water's edge. Among the more famous riverside spots are *Kew*, with its magnificent Botanical Gardens; *Richmond*; Hampton Court Palace, with its beautiful gardens, picture galleries and memories of its royal occupants since the time of Cardinal Wolsey; Runnymede, the island on which Magna Charta was

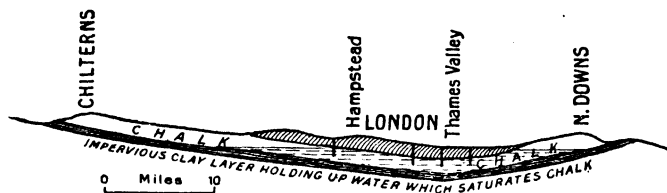


FIG. 39.—London's Water Supply : (b) Artesian Wells through the London clay into the water-bearing chalk.

signed; and *Windsor*, with its famous Royal Castle on the right bank of the river facing Eton College on the left.

Small steamers and barges can ascend the river to *Reading*, famous for its biscuit factories and railway works, and then following the Thames through the picturesque Goring Gap, between the Chilterns and the White Horse Hills, finally reach *Oxford*.

QUESTIONS AND EXERCISES

1. Why are most of the great London railway termini on the north or west side of the city?
2. Which is the only bridge in London lower down the river than London Bridge? Explain its name and its peculiar structure. What public means of crossing the Thames are there below this point?
3. Which modern railways follow very closely the old Roman Roads shown in Fig. 34?
4. Why has the East End of London become the least pleasant to live in?
5. Why are representative meetings of people from all parts of the country commonly held in London?
6. Why are so many people in London employed in clerical work?
7. Find from a newspaper the chief shipping lines which use London as a terminal port and the parts of the world they serve.

8. London is the chief air port of Britain. Why? Where is the chief aerodrome and what are the chief regular air routes from it?

9. Describe the journey from your own town to London. How many miles is it? How long would it take (a) by road, (b) by rail, (c) by air? What would it cost?

10. Compare the aeroplane photograph on page 143 with sketch map on p. 145 (Fig. 36). See if you can find in the picture: The Houses of Parliament, Westminster Abbey and Bridge, Waterloo Station, Charing Cross Railway Bridge, Whitehall, the London County Hall, Victoria Street. In what direction was the camera facing? Notice in the river the many "lighters" or sailless barges used to bring cargo up stream from the docks. On which bank of the river are the Houses of Parliament?

CHAPTER XIX

TRADE AND COMMERCE

We have now studied most of the different regions of our own country and seen how their inhabitants have turned their special climate and productions to good account, so that they might earn a living by helping people in other parts to live more comfortably. Thus a city clerk and his family may live in a house built of bricks made from London clay, feed on bread made from East Anglian corn, meat produced by the sheep on the Downs and the cattle of Ireland, fruit grown on the Weald, and milk from the dairy farms of Cheshire. Their winter clothing may be made in the West Riding of Yorkshire or the South of Scotland, while their lighter summer clothes come from Lancashire and their boots and shoes from Northampton. Their fires are kept burning and the trains that carry them from their suburban homes to work or pleasure in the city are driven by coal from the Midlands or South Wales; and when holiday time comes round they may go to renew their health and strength in the fresh air of the Highlands of Scotland or of country and seaside districts closer at hand.

"What does the clerk do in exchange for this?" you

may ask. It is such work as his, done in the thousands of offices in the great towns and cities of the country, that enables all the activities carried on in various parts of the country to be linked up with one another so that they may be of use to all.

This interchange of products between one region of a country and another is spoken of as *Trade*, and the enormous amount of trade that is carried on in Britain can be judged by such facts as the following. In 1930 no less than 304 million tons of produce was carried on the railways and some 13 million tons on the canals, apart from all that travelled along the roads in carts and motor lorries.

Up till a hundred and fifty years ago trade was very small indeed, and what there was was carried on along the roads which followed the course of the old highways laid down by the Romans centuries before. Most of these roads were in very poor condition in the winter time, and wheeled traffic along them was very difficult. The few people who travelled mainly rode on horse-back, and even goods were carried from place to place by pack-horses. But when the great value of our supplies of coal and iron came to be recognized, other means of transport for these heavy materials had to be found, and in the middle of the eighteenth century experiments began to be made with canals, especially in the Midlands and the North of England, where there was most coal and iron. Many of these canals are still in use (*see* Fig. 16), and it is thought that if the chief of them were made wider and deeper they could be still more useful.

But a hundred years ago came the invention of the steam-driven locomotive and steel railways along which much heavier loads could be drawn much more quickly than in the case of the canals. Although transport by railway is rather more costly, its great advantages have led to its becoming the chief means of transport in the country, as can be seen by comparing the figures quoted

in an earlier paragraph. Like the canals the earliest railways were made in the mineral districts of the North and Midlands, but very soon railways were laid down to connect the larger towns with London, the capital of the country. It is interesting to note how the main railway lines of the country follow the old roads along which the towns had sprung up (*see* Fig. 40 A, B).

The invention of the internal-combustion engine using petrol has brought about another change in means of transport in recent years, and the railway may find serious rivals both for goods and passenger traffic in the lorry and the motor-car, and even in the aeroplane. The last-named is less dependent upon the physical features of the country for its routes than are roads, canals or railways, while none of these can compete with aerial transport in the matter of speed.

All the means of transport mentioned so far are mainly concerned with the carriage of goods or passengers, but it should be remembered that in the matter of trade the quick transport of news and ideas is equally important, so that farmers and manufacturers and the customers who need their products may be kept in touch with each other. By letters and newspapers quickly carried by road or rail or air no one in any part of the country need now wait longer than a day to know what is happening in any other part, while by telegraphy he can usually find what he wants to know in a few hours and by telephony in a few minutes. Even these processes may be speeded up by the developments that are now taking place in the wireless transmission of information of all kinds.

COMMERCE

So far we have spoken of trade between one part of the country and another, but we have learnt that some regions of Britain are not able to obtain all the materials for their industries within our islands, while we have also seen that all the wheat grown in Britain is only enough to

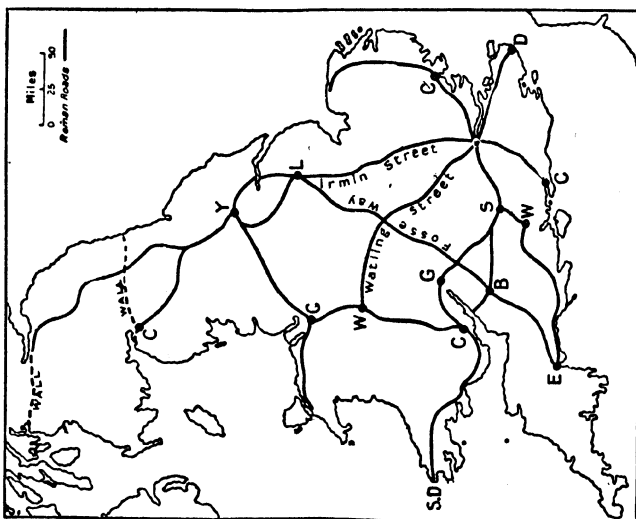


Fig. 40A.—Chief Roman Roads in Britain.

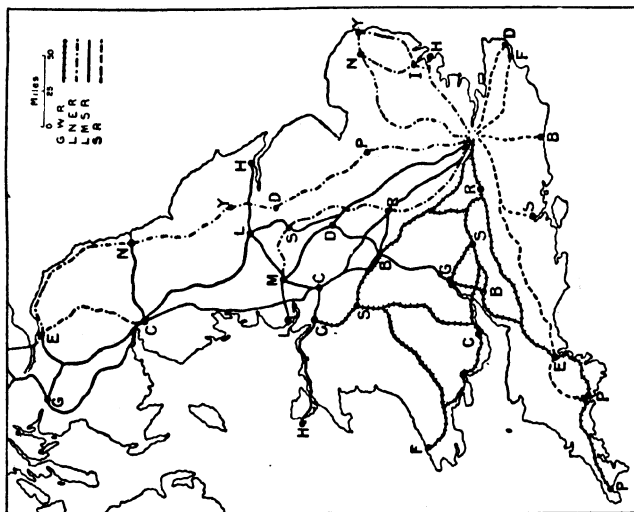


Fig. 40B.—Chief Modern Railway Routes in Britain.

make one loaf out of every five consumed in the homeland. Thus there has sprung up a great trade between our country and others overseas, and this foreign trade is spoken of as *Commerce*.

You may be surprised to learn that in spite of its small size compared with many other countries Britain is still the greatest commercial country in the world, judged by the total value of the goods exported or sent out and the goods imported or brought from abroad in the course of a year. Let us try to see how this has come about.

Just as we have seen that there was little trade within the country up till a century and a half ago, so also there was little commerce between one country and another, owing to the difficulties of communication. What the railway has done for the one, it and the steamship have done for the other ; and as both were British inventions, our country had the benefit of being first in the field with the means of carrying on commerce on a large scale.

Then also the country is blessed with enormous supplies of coal out of all proportion to its size, and as coal was till recent years the chief source of power for driving machinery to make manufactured goods on a large scale, this was another great advantage. For our factories were able to turn out vast quantities of goods, particularly textiles and iron goods, that other countries were eager to buy, and although this caused farm labourers in Britain to leave the country for the town, where higher wages could be earned in the factories, it also enabled foodstuffs such as wheat and meat to be brought from countries like the United States of America, Canada, and Australia, whose great grasslands were beginning to be opened up by the pioneers. These countries at that time had vast surpluses of foodstuffs but few means of making clothing and other necessities of settled civilized life, so that an exchange of products was welcomed on both sides.

Another advantage of Britain is her island position which kept her free from invasion by foreign powers, and

prevented her from becoming entangled in the wars between the nations of Europe, so that she was enabled to develop her industries in peace.

Finally Britons, many of whom lived within sight of the sea, learned to have no fear of it, and crews were never lacking to man the ships built in British shipyards to sail on all the seas of the world, while the mild British climate kept our harbours open for them to come and go at all times.

Thus it has come about that more than half of all the merchant shipping in the world has been built in the British Isles, while British ships not only carry merchandise to and from the home land but also carry on much of the commerce between foreign countries less favourably situated in this respect.

It can hardly be hoped that Britain will always hold first place in the world's commerce, for there are other countries, such as the United States of America, larger in area, population and natural resources; and if, as is hoped, the world gradually learns the folly of war and becomes more peacefully inclined, the commerce of these countries is bound to increase. We shall learn in later books of this series more of some of these countries, but also of those great British Dominions overseas which have been opened up and developed by Britons and their descendants, and we shall see that even if the mother country may decline in relative importance there is every reason why the British Empire should remain second to none in industry and commerce.

A visit to the large docks in London, Liverpool, Hull, or any other big seaport would show an amazing variety of materials being unloaded from ships from all corners of the world, but in any year we should find the things landed in largest quantities to be Wheat, Meat, Cotton, Wool, Dairy Produce, Petroleum, Timber, Tea, and Sugar. We shall learn more of these and many other products and of the countries whence they come later on, but it

would be a good exercise to draw or trace a map of the world and mark the regions from which these come and the routes by which they reach us.

The wheat comes mainly from Canada, the United States of America, Argentina, Australia, and India. The meat also comes mainly from the first four countries just named, while New Zealand also sends shiploads of frozen mutton. Most of the cotton comes from the southern part of the United States of America and from Egypt, while Australia, New Zealand, South Africa and Argentina are great suppliers of wool. Dairy produce reaches us from Holland, Denmark, and Sweden, but large quantities of butter and cheese now come in from Australia and New Zealand, and cheese also from Canada. Petroleum, a crude mineral oil from which paraffin, petrol and many other things are obtained, is imported mainly from the United States and Venezuela in South America, and smaller quantities are obtained from Mexico, Rumania, Iran, Burma, and Borneo. Timber in the form of planks, pit-props, and even of doors and window-frames comes from the countries around the Baltic Sea and from Canada, while the finer cabinet woods are obtained from hotter countries, e.g. mahogany from Honduras and teak from Burma. Tea and cane-sugar are also the products of hot wet countries. The hill slopes of India, Ceylon and China provide most of the former, while the coastal plains of the islands of the West Indies, Mauritius, and Queensland in Australia, are famous for their cane-sugar. Sugar obtained from the sugar beet is imported mainly from the countries of Central Europe.

We have already seen that most of these things are purchased in exchange for our own surplus of manufactured goods which make up more than two-thirds of all our exports. Cotton yarn and cotton goods from South Lancashire and elsewhere form by far the largest item. These find their way to practically every country in the world, and especially to the thickly peopled hot

countries such as India, where cotton clothing is worn by the masses of the people at all seasons. Iron goods and machinery of all kinds come next in order of our exports. Many a foreign land is being opened up with the help of British-made locomotives running on steel rails and across steel bridges made in Britain, and even our trade rivals fit up their mills with textile and other machinery bought from the country which has had the longest experience in this kind of work. After iron goods comes coal, the only raw material of which Britain has sufficient for her needs and some for export. For this commodity the countries of Western and Southern Europe are our best customers, while various isolated coaling stations used by shipping on the great ocean routes are supplied from the coalfields of South Wales and North-East England.

Woollen yarn and goods, produced mainly in the West Riding of Yorkshire, come next in order of our exports, closely followed in value by ships turned out from the shipyards of the Clyde, Tyne, Tees, Humber, Mersey, and Belfast Lough.

Until quite recent years the whole of this British commerce was sea-borne, i.e. carried in ships, but we have lately seen the small beginnings of air-borne commerce, and air liners with light but valuable cargoes now leave London regularly for Paris, Amsterdam, and Cologne, all of which can be reached in less than half the time occupied by the older methods of transport. It seems unlikely that air transport can ever replace shipping, but it will undoubtedly be greatly developed in the near future.

It is interesting to notice that about a sixth of all the men in Great Britain are engaged in trade and commerce, that is in the work connected with the buying and selling and transport of goods. For apart from railwaymen and seamen there are dock workers, clerks in merchants' offices, insurance offices and banks, and workers in the cable and wireless stations, the work of all of whom is necessary if the great machinery of trade and commerce

is to run smoothly and perform its part in linking together in useful service all parts of the country, the Empire and the world.

QUESTIONS AND EXERCISES

1. What are the advantages and disadvantages of canals as a means of transport ?

2. Take each of the great railway groups in turn and state the regions through which they pass and the sort of traffic which will come on to the railway from each.

3. What are the advantages and disadvantages of aerial transport ?

4. How did the life of people in Britain before the time of railways differ from our life to-day ?

5. Trace an outline map of the world and show the chief countries from which Britain receives her principal imports of foodstuffs and raw materials. Also mark the routes by means of which these products reach Britain.

6. How does war affect Trade and Commerce ?

7. In 1932 the *Imports* into Britain were classified as follows : Food, Drink, and Tobacco, £377 million ; Raw Materials, £166 million ; Manufactured Goods, £160 million. Total, £703 million. Of these £250 million worth came from British Possessions and £453 million from foreign countries. Draw two equal rectangles side by side and divide them to show, (a) the values of the different classes of Imports ; (b) the values of the Imports received from different sources. Let 1 cm. in length represent £100 million value.

8. The *Export* Values for 1932 were as follows : Food, Drink, and Tobacco, £48 million ; Raw Materials, £67 million ; Manufactures, £288 million. Total, £403 million. There were sent to British Possessions £177 million, Foreign Countries £226 million. Draw rectangles to represent these on the same scale as in Question 7, and compare the two sets of diagrams. Why do you think we do more trade with Foreign Countries than with British Possessions ?

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